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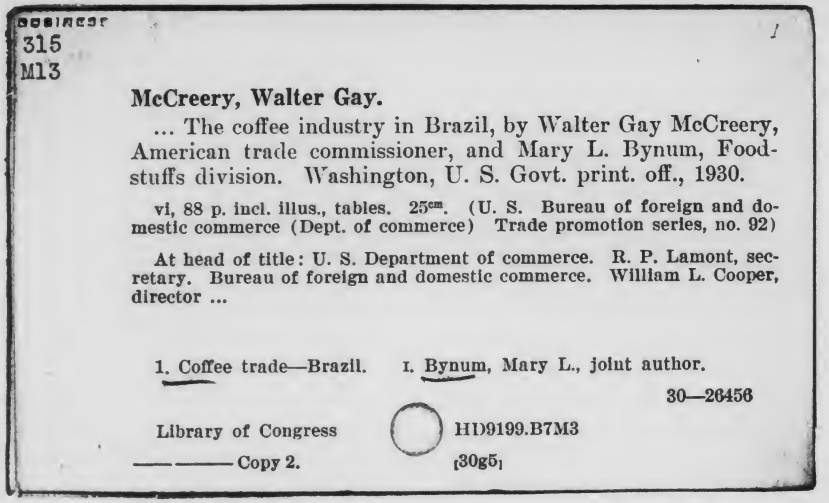

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THE COFFEE INDUSTRY IN BRAZIL

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Trade Promotion Series—No. 92

THE COFFEE INDUSTRY IN BRAZIL

By

WALTER GAY McCREERY
American Trade Commissioner
and
MARY L. BYNUM
Foodstuffs Division

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FOREWORD

Brazil furnishes from two-thirds to three-fourths of the coffee produced throughout the world, and 50 per cent of the coffee moving out from Brazilian ports is destined for the United States alone. The quantity of Brazilian coffee imported into the United States in the calendar year 1928 amounted to 7,280,000 bags (of 132 pounds), valued at $189,839,000, compared with a total importation of 11,034,000 bags, valued at $309,644,000; Brazil furnished 66 per cent of the total quantity.

In the light of these figures, it is believed that the following study of the Brazilian coffee industry will be of interest, not only to those firms actively engaged in the coffee business, but also to students and organizations interested in Latin-American affairs generally.

Obviously, it has been impossible to cover all phases of such a complex subject in a review of this nature; additional information is on file in the Foodstuffs Division of the Bureau of Foreign and Domestic Commerce.

WILLIAM L. COOPER, *Director*,
Bureau of Foreign and Domestic Commerce.

DECEMBER, 1929.

AUTHORS' NOTE

An attempt has been made in the following pages to present a description of the numerous phases of the Brazilian coffee industry; this description, while not unduly technical, is believed to be sufficiently detailed to be of value and interest to those who are engaged in the coffee business. Since the subject in all of its ramifications is an extremely complex one, many omissions have necessarily been made. The authors, however, in this connection, wish to state that what may seem to be omissions are often procedures which either are unknown in Brazil or for which there are no available data.

The Brazilian method of expressing currency has been followed. The currency of the country is made up of reis, milreis, and contos. One milreis is 1,000 reis, and 1 conto is 1,000 milreis. Amounts in contos are followed by the colon, those in milreis by the dollar mark. For example, 4 contos 538 milreis and 295 reis is expressed 4:538$295. Conversions to United States currency, with few exceptions, have been made at 12 cents to the milreis. The par value of the milreis is 11.96 cents and the average exchange rate in October, 1929, was 11.8715 cents.

A few Portuguese words for which there are no exact equivalents in English and which are particularly "pithy" are included in the text. In all cases their significance is made evident.

The authors wish to express deep appreciation of the assistance given by the following persons: Dr. Cid Braune, Mr. Eduardo Camps, Srs. Sylvio and Renato Caldeira, Mr. Harold Derickson, Mr. Dulley, Mr. H. Gillam, Mr. Frank Irwin, Mr. Carlton Jackson, Mr. Richard Long, Sr. S. Medeiros, Dr. Augusto Ramos, Mr. Milton Rowland, Sr. Frederico Snell, Mr. Robert Tyler, Mr. John Thaden, Sr. Jayme Wright, and many others who have devoted much time and thought to the questions put to them.

THE COFFEE INDUSTRY IN BRAZIL

By Trade Commissioner Walter Gay McCreery and Mary L. Bynum, Foodstuffs Division

CULTIVATION AND MARKETING

INTRODUCTION OF COFFEE INTO BRAZIL

The history of the introduction of coffee into various parts of the world is very obscure as to exact dates and names, and consequently there are different versions of the story of how the coffee plant found its way into the Western Hemisphere. The following are those most generally accepted:

About the first of the eighteenth century, Nicolaus Witsen, burgomaster of Amsterdam, requested Van Horn, then Governor of Batavia, to send him, as a curiosity, a few slips of the coffee shrub which flourished at that time in the Netherland East Indies. They were received and planted in the Botanical Garden of Amsterdam. One of these was presented in 1714 to Louis XIV of France and was set out in the Garden of Plants in Paris. Gabriel Mathieu de Clieu (also sometimes spelled Declieux and de Clieux), sailor and lieutenant of King Louis XIV in Martinique, brought the first slip to that island in 1717, 1720, or 1723. Tradition has it that the water supply nearly gave out on the ship, and that De Clieu used part of his ration to keep alive the plant intrusted to his care. Other historians report that the Dutch were the first to bring plants in 1718 to Surinam.

It has never been clearly determined when and how the first trees reached Brazil. The common story is that the Governor of Cayenne, De La Motte Aigron, surreptitiously brought a plant from Surinam to Cayenne, and that later Francisco de Mello Palheta carried five plants from there to Para. Another version is that the wife of the Governor of Cayenne gave Francisco de Mello Palheta a few seeds to carry away in his pocket, despite the fact that the exportation of plants or seeds capable of germination was prohibited. The date of the introduction into Brazil is celebrated as 1727. Still another historian, however, claims that coffee was first brought to Brazil directly from the Orient in 1581.

Joao Alberto Castello Branco, the Belgian priest Moltke, Hoppmann, and others are all variously credited with first growing coffee in Rio de Janeiro some time between 1760 and 1774. Certainly Moltke, and the then bishop of Rio de Janeiro, Joaquim Bruno, were

active in its propagation. From Rio de Janeiro and Para the plant was spread over all Brazil. It is interesting to note that the first recorded exportation of coffee was from Para in 1732 as a sample.

The industry in Brazil, particularly in the State of Sao Paulo, which is to-day the chief producing State, developed at a slow rate until about 1835; dating from that year, cultivation began on an extensive scale, resulting in good harvests some seven years later. Coffee is now cultivated in Sao Paulo, Minas Geraes, Rio de Janeiro, Espirito Santo, Parana, Bahia, Pernambuco, Goyaz, Ceara, Parahyba, Santa Catharina, Alagoas, Sergipe, Matto Grosso, and several other States.

SPECIES AND VARIETIES CULTIVATED

The coffee of commerce belongs to the genus Coffea L., of the family Rubiaceæ (order Rubiales), and while there are many species, those actually in cultivation on a commercial scale throughout the world are few in number, the best known being *Coffea arabica*, *liberica*, and *robusta*. The *arabica* species forms the bulk of the world's trade.

The divers varieties of coffee preferred in the State of Sao Paulo are all derived from the *Coffea arabica* species. *Coffea liberica* is not highly esteemed because of the comparatively large size of the trees and the irregularity with which the cherries mature, making picking all at one time difficult; consequently it is not cultivated extensively. The varieties of the *Coffea arabica* best liked are: Café nacionál or commúm, which has become fully acclimated and is the most robust and strongest of all; café Bourbon, which is more delicate and is planted in the best soil, since it produces more than the café commúm, but is more sensitive to cold winds and frosts; café amarello, or yellow (Botucatu), the beans of which are said to be particularly rich in caffeine; and café Maragogipe, the largest of the coffee trees cultivated in Sao Paulo, which produces a very agreeably flavored bean. It was discovered at Maragogipe, State of Bahia. The varieties known as Java and Murtha are occasionally found, the latter being considered by some botanists as a degenerated Bourbon. According to Dr. L. P. Barreto, who is said to have introduced the Bourbon variety into Sao Paulo, this is not the true Bourbon, but is a hybrid resulting from the crossing of the café commúm (*Coffea arabica*) with the café Murtha.

A hybrid of Bourbon-Maragogipe is also planted. The Maragogipe, which is not extensively grown, is more vigorous and stronger than the Bourbon, but its production is small although the beans are unusually large. While the Bourbon is more subject to diseases, it is cultivated much more extensively because of its large yield. Unfortunately, it ages quickly, being fairly well exhausted after about 20 years of production, while the café commúm and the amarello produce well for many more years.

The following table shows the comparative difference in production of the various trees, as determined by experiment in Sao Paulo in 1908 (the findings are only approximate).

RELATIVE PRODUCTIVITY OF VARIETIES OF COFFEE IN BRAZIL

Varieties	Number of trees	Crop picked, in cherry	
		Liters [1]	Liters [1] per tree
Café Bourbon-Maragogipe	60	382	6.4
Café commúm or nacionál	110	750	6.8
Café amarello or Botucatu	92	370	4.0
Café Bourbon	108	695	6.4
Café Murtha	52	300	5.8
Café Mexico	4	66	16.3
Café Mauricia	6	64	10.7
Café Maragogipe	4	33	8.3

[1] 1 liter is equivalent to 0.9081 quart, dry measure.

There are many other varieties of trees to be found in Brazil, but those mentioned above comprise the majority. The same varieties grown in Sao Paulo, the principal coffee State, are to be found in the other principal producing districts of the country, although many of their characteristics are modified by changes in climate and soil.

DESCRIPTION OF COFFEE

Coffea arabica is a shrub which attains an average height of 16 to 20 feet (ordinarily 8 to 10 feet in Brazil), varying with local conditions and cultivation. Its bark is ash colored and rough; its branches long, flexible, and numerous, bearing foliage the year round. The leaves are almost always elliptical or oval, their length varying from 2 to 7 or 8 inches and their width from one-half to 2 inches. The tree flowers many times during the course of a year, the flowers being perfectly white and similar to jasmine, giving off a very sweet and penetrating odor. The odor is so pronounced sometimes in large coffee districts that, although agreeable to most people, it is sickening to others. About six or seven months are required for the development of the cherry. The cherry is green at first, turns red as it ripens, and is black or a reddish black when fully ripe. It is formed in two essential parts—the outside hull or pulp and usually two of the familiar beans with their flat sides together, forming a round whole slightly smaller than an ordinary grape and ellipsoidal in shape. At times when the cherries do not mature fully the two beans will remain joined together and form what is known to the coffee trade as "peaberries," called "moka" in Brazil. The cherry is enveloped in the epicarp which covers the pulp or mesocarp. Around the two beans, or one, as the case may be, there is a parchmentlike substance called the endocarp, and just next to the beans themselves, adhering very closely, there is the spermoderm, or silver skin, which in the process of cleaning is never entirely removed until roasting takes place; and, lastly, there is the bean or endosperm, which is the coffee of commerce.

PERIOD OF BEARING

The coffee plant begins to bear at about the third or fourth year, but not in considerable commercial quantities until the sixth or eighth

year. Production continues sometimes for 100 years, but the period of maximum production extends generally to about the twelfth year or a few years longer. The yield per tree is discussed in the section devoted to production and the number of trees in bearing in Brazil.

WEATHER AND TEMPERATURE

The Brazilian coffee regions lie in the temperate and subtropical zones, the principal production being in the former. The average annual temperature of these areas is from 17° to 25° C. (62.6° to 77° F.), about 20° C. (68° F.) being considered the most suitable. Averages as low as 15° C. (59° F.) and as high as 30° C. (86° F.) are not prohibitive, but they do not permit of the best development of the

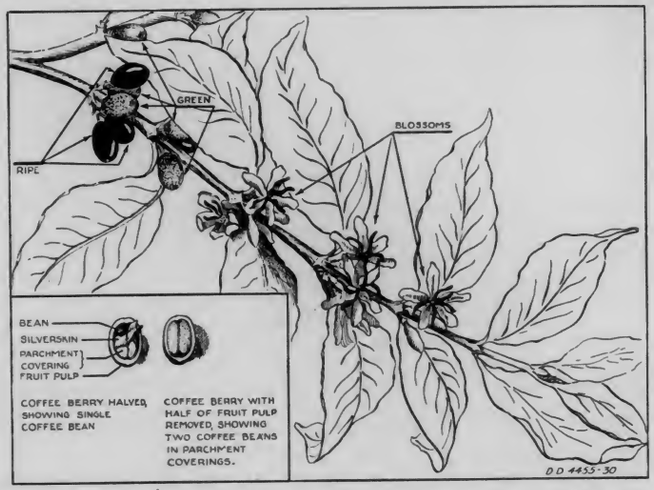

FIGURE 1.—Coffee blossoms, green cherries, and ripe cherries on the same bough. Insert shows interior of cherry. (Based on photograph in "The Encyclopedia of Food," by Artemus Ward)

trees. It is desirable to have the rains followed by a strong sun, a condition which usually obtains in Brazil. Many other coffee-producing countries suffer from too great an intensity of sunlight, and it is often necessary to protect the trees with shade plants of some sort. This is never necessary in the important producing districts in Brazil, except in the nurseries where the delicate young plants are being grown.

Especially in Sao Paulo, southern Minas Geraes, and Parana, from June to September, the fazendeiros (farmers or planters) watch the thermometer with anxious eyes. It is at this time that the dreaded cold winds and frosts are likely to come. Every year there are "frost scares" and a great deal of worried discussion, but it was only in 1870, 1886, 1902, and 1918, according to Dr. Augusto Ramos, that it is certain severe damage was done. Doctor Ramos

estimates that in 1902 and 1918 together at least 500,000,000 trees were damaged. He has attempted to discover whether or not frosts occurred in the years 1854, 1838, and 1822, for the purpose of substantiating a theory that they occur at approximately 16-year intervals. He was unable to obtain data for the years 1854 and 1838, but did find that there had been a great cold wave in 1822.

Frost has the same effect on coffee trees as it has on other subtropical plants. If the temperature is low enough the trees will be killed entirely, while, if moderate, their growth will be stunted and they will not produce well for several years. A few hours at 0° C. (32° F.) is sufficient to kill them. Cold winds or a temperature well above 0° C. during the flowering season are likely to cause more damage than a strong frost in midwinter when the trees are nearly dormant. The frosts of 1902 and 1918, for both of which we have accurate record, were preceded by much the same circumstances. Cold waves started up from the south, being reported in Argentina. Barometers in Sao Paulo first went down, then stopped, and then slowly climbed up. Simultaneously the thermometers did just the opposite, the temperature first rising and then falling steadily. The cold was preceded the night before by more than one-fourth inch of rain. In 1902 the temperature held at 0° C. and even as low as −5° C. in some localities for several hours, while in 1918, when the damage was more severe, the temperature was from 1° to 5° or 6° C. The cold winds and other atmospheric conditions were responsible for this apparent anomaly.

The other coffee-producing districts suffer little danger from frost damage, since they are farther to the north or closer to the sea.

SEASONS

Rainfall is probably the most important element in the production of coffee. It should be heavy and regular while the crop is maturing and very light during the picking and drying season; in other words, it should be divided into regular rainy and dry seasons. In Brazil these seasons are usually distinct, the rainy period extending from September to March and the dry season from April to August. During an ideal year, in the State of Sao Paulo, for example, the spring rains, those which usually commence in October, should come just after the crop has been picked and dried. They should be regular and persistent but not too heavy, since a severe downpour will knock the flowers off the trees before they have set. They should continue in moderate amounts, unaccompanied by winds or low temperatures, until April or May, by which time the beans will have become fairly matured. The dry season should then set in and continue through the picking season.

Heavy rains during the picking season will knock the mature cherries off the trees and wash them away; and if unexpected, they will wet the coffee on the drying grounds, which causes the most serious damage of all. Rain coming during the picking season stimulates the trees greatly and at the time when they most need it, but it has the disadvantage of causing the first flowering to come too early. Dry spells either during the flowering or while the crop is maturing are very harmful. Persistent dry weather during the flowering will

delay it to such an extent that the crop will be affected. Dry weather after the flowering period not only retards the development of the crop, but prevents the maturity of many of the cherries and the premature drying out of others.

"The ideal amount of rain in the State of Sao Paulo," according to Dr. Augusto Ramos, "is some dozens of millimeters in August, some 100 in September, about 200 millimeters (7.88 inches) in October, from 200 to 350 (13.79 inches) a month from November to January, about 200 in February, from 100 to 150 (3.94 to 5.91 inches) in March, less in April, and almost none from May to July." (One millimeter equals 0.0394 inch.)

The average annual rainfall in the principal coffee-producing regions of Brazil is about 1,500 millimeters (59 inches). In parts of the States of Rio de Janeiro and Espirito Santo it is a little less, ranging from 1,000 to 1,250 millimeters (39 to 49 inches).

ALTITUDE

The altitude above sea level of the coffee lands is, of course, an important factor in weather conditions. It is also said to affect the activity of the trees, owing to the difference in atmospheric pressure. Trees planted at a high altitude flourish more strongly than those near sea level because the weight of the air is less. (Abelardo Pompeu do Amaral in "Cultura Practica e Racional do Cafeeiro.")

With respect to altitude, coffee regions in Brazil may be divided into two zones. The first zone, in which the maritime climate predominates, is comprised of the States of Rio de Janeiro, Espirito Santo, and those parts of Minas Geraes and Sao Paulo which belong to the valley of the Parahyba River. There successful coffee production can be accomplished only at altitudes varying from 250 to 550 meters (820 to 1,806 feet). Plantations situated in that zone below 200 meters produce only undesirable coffees known as café capitania, while above 550 meters the crops are late and irregular. The second zone, known as that of Santos, begins about 150 kilometers (93.2 miles) inland from that port between 21° and 24° latitude. In that zone the climate is no longer tempered by the sea and is notably warmer than in the coffee regions of the State of Rio de Janeiro. One authority says that below an altitude of 600 meters (1,970 feet) plantations offer little chance of success, and that they are found principally from 800 to 850 meters (2,627 to 2,791 feet) above sea level, sometimes going as high as 1,000 meters (3,283 feet). Another author disputes this, saying "I well know that certain authors affirm that the plantations of the State of Sao Paulo have a poor chance of success below an altitude of 600 meters, and that they are principally found between 800 and 850 meters. There certainly is a small error here as the coffee zone, with few exceptions, is below 800 meters." The writer has carefully computed the altitude of 128 of the principal coffee-producing municipalities in Sao Paulo and finds that their average height above the sea is 625 meters (2,052 feet). The average altitude of the eight municipalities with the greatest number of trees in production (1926) is 603 meters (1,980 feet). The six principal producing municipalities in southern Minas Geraes average 835 meters (2,742 feet). (One meter equals 39.4 inches.)

SOIL AND CONTOUR

The coffee plant needs a porous, deep, and permeable soil. The principal soils of the coffee zones of Brazil are those derived from basalts and diabases, which constitute the famous "terra roxa" (red earth); those resulting from the decomposition of granites, gneiss, and other metamorphic rocks, known as terra massapé (yellow or black); and "salmourão," and also the derivatives of cretaceous sandstones called "Baurú." The first, terra roxa, is the most important and forms the great majority of the coffee lands of the country. Among them one finds the greatest agricultural districts of Sao Paulo, Parana, the Minas Triangulo (extreme western part of the State), and Matto Grosso. The second type is found in Minas Geraes, part of Sao Paulo, Rio de Janeiro, Espirito Santo, Bahia, Pernambuco, Parahyba do Norte, and Ceara. In general, that type forms good land which occasionally rivals in fertility the terra roxa of Sao Paulo.

At times the terra roxa is found to extend to a depth of more than 60 feet, which is of great advantage to the coffee trees or any other plant which has long roots. This terra roxa contains a large quantity of iron oxide, its principal action being to modify the physical properties of the soil. The presence of iron increases the porosity and, consequently, the circulation of water, which brings with it, in solution, the several substances derived from the rocks in decomposition. The porosity also assists the penetration of the roots, which are thus able to draw from a larger area of soil. These peculiar properties of the terra roxa account for its great fertility. American and European agriculturists are said to have difficulty in understanding this fertility, inasmuch as chemical analyses, on which they are acustomed to base their judgment of the value of soils, show this type to be poor in the principal nutritive elements, such as phosphorus, potash, lime, and humus.

In most of Minas Geraes and the other States referred to above, the soil is of the second type, that derived from granite and gneiss. These rocks frequently carry large quantities of the ferromagnesium, minerals, and apatite, but it is only in those places where this soil has a black or yellow color that the coffee tree flourishes.

There is little doubt but that the quality of the coffee, as well as the quantity, is influenced by the type of soil. Generally speaking, all of the regions where the terra roxa exists produce "soft" coffee, while that soil derived from the granite and gneiss formations produces coffee with the typical "rioy" or "hard" flavor. These qualities are explained under the section on the grading of coffee.

The contour of the land on which coffee is planted is important in Brazil. Rolling or even hilly country is always preferred to that which is flat. The coffee tree requires a large amount of moisture to develop and produce properly, but the soil should not remain soggy. Consequently, the sides of hills, where the heavy rainfall drains off through the soil slowly, are ideal. Among the principal producing States, Sao Paulo has the least rough terrain. It has an undulating contour similar to that found in the more hilly sections of Iowa and Illinois, and is seldom broken by high or rough ridges. In the far western part of Minas Geraes the country is flatter, while in the southern part of the State it is generally similar to Sao Paulo.

The rest of Minas Geraes and the States of Rio de Janeiro and Espirito Santo are much more irregular and are likely to be broken frequently by rocky ridges and mountain ranges, although stretches of smooth, rolling country are not difficult to find.

GROWING AND CULTIVATION

The soil selected for the coffee plantation is generally covered with virgin forests or woods and is rich. The ground is cleared, the bushes and undergrowth being cut away with a billhook. The grubbing is carefully done in order to facilitate the final burning off of the vegetation. The best time for the grubbing is from May to August. The trees are felled with an ax, and none are left for temporary or permanent shade to the coffee plants as in some other coffee countries. After the felling of the trees, the burning takes place when the boughs and twigs are sufficiently dry to burn readily. Careful alignment of the holes, or hills, for the future coffee plants is necessary in order that the plants may have proper air and light. The holes are about 1 foot square and 1 foot deep, and from 9 to 12 feet apart, in squares or in alternating rows.

For seeding purposes, the seed are carefully selected of ripe cherries, dried in the shade. Some planters remove the pulp from the cherries and plant the seed in the parchment, having depulped and dried them by hand. In some cases they are soaked in water to stimulate germination. Several seeds are placed in each of the holes, which have been previously prepared and manured, and are lightly covered with earth. The holes require temporary shade in order that the sun's rays will not kill the young plants. In the course of time the seed germinate, and in Sao Paulo from two to four are left in the hill, the several plants being known as one coffee tree for statistical purposes. This method is known as direct planting, since the seed are sown directly in their permanent location on the plantation.

Other methods include the formation of a nursery bed and the planting of well-grown seedlings. The bed is made on the ground in a sheltered clearing in the forest or woods, close by the plantation. The seed are generally obtained by depulping the cherries, and after they have soaked for some 10 hours they are sown in the bed, which has been well manured. In about two weeks the sprouts appear. In Sao Paulo the seed beds are usually prepared in September and October. Sometimes the seed are sown in little wicker baskets (jacásinhos) to facilitate transplanting. As in the case of the seed bed and of direct sowing on the plantation, the young plants must have shade, which is afforded by temporary shelters.

The plants grown in the seed bed and in the little baskets are transplanted to their permanent quarters on the plantation. In the first case the seedlings are carefully removed from the bed, part of the main root is cut away, and the seedling is placed in the hole. In the latter case, the baskets containing the seedlings are merely placed in the holes. Transplanting is ordinarily done when the seedlings are about a year old, being about 1 foot or more high. Generally speaking, permanent shade is not given to the adult coffee

trees, except in certain parts of Brazil. For the first year, however, the young plants require some shade which is attained in various ways. The most common is probably that of sticks of wood laid across each other in a square. Protection is also given by cornstalks arranged in a conical fashion. Beans, corn, and other crops are sometimes interplanted with the coffee for shade as well as food and market purposes. There is a great deal of discussion, however, as to the merits and effects of that practice.

FIGURE 2.—Nursery, showing young coffee trees ready to be transplanted

The coffee plantation requires care in weeding, pruning, cleaning, and the prevention and control of diseases and pests. No return, except from the catch crops, planted among the coffee trees, can be expected until about the third or fourth year.

HARVESTING AND PREPARATION

The picking season varies in parts of Brazil; in Sao Paulo, however, the harvesting of the new crop usually begins in April. The method generally employed in Brazil is that of stripping all the

The rest of Minas Geraes and the States of Rio de Janeiro and Espirito Santo are much more irregular and are likely to be broken frequently by rocky ridges and mountain ranges, although stretches of smooth, rolling country are not difficult to find.

GROWING AND CULTIVATION

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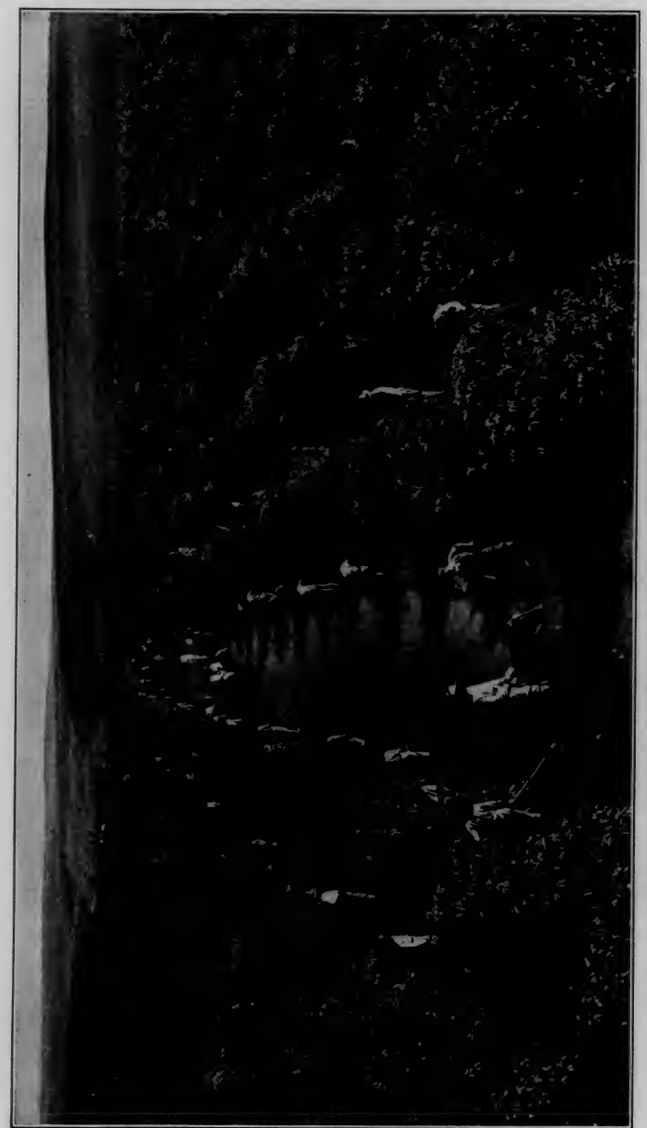

FIGURE 3.—Cleaning ground around coffee trees

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FIGURE 4.—Coffee tree in bloom

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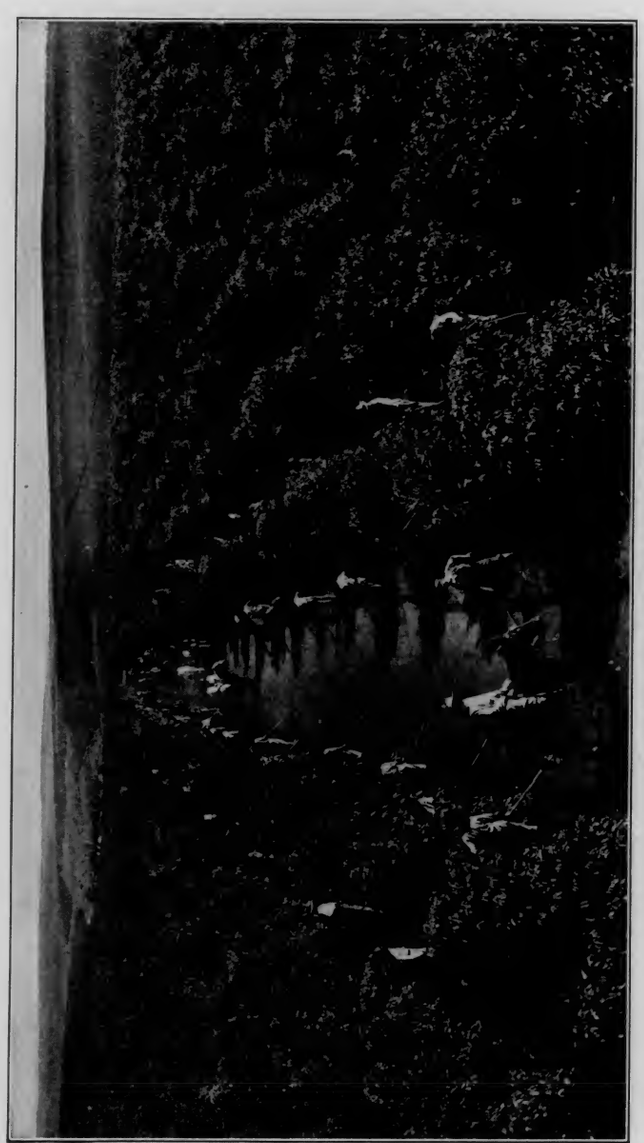

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DRY METHOD

The dry method of preparation is generally followed in Brazil. As cherries of varying degrees of ripeness are brought in, it is desirable to separate those that have dried on the trees and may have fallen to the ground or remained on the trees (these are known

FIGURE 5.—Coffee ready for harvest

as cafés em côco) from those that are ripe and green, as the latter will require a longer drying period. Consequently the entire lot is dumped into tanks of water and these dried cherries, being comparatively light, are floated off, by means of water in flumes, to the drying yards, which are usually of tile, cement, or, on some of the older plantations, hard-pressed earth. The dirt and stones, being heavier, sink to the bottom of the tank. The ripe and green cherries,

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not so heavy as the dirt and stones, do not sink so rapidly, and not so light as the dried cherries, do not float so rapidly, so that they can be conveyed properly in turn to the drying yards, to which end various contrivances are used in and about the tanks.

Different ways of taking the cherries to the drying yards are necessary, depending, of course, on the construction and layout of the tanks, flumes, and drying yards. The illustrations show some of the means used.

The length of time required for drying varies from 15 to 24 days or longer. Mechanical driers are not in general use, but are being

FIGURE 8.—Coffee cherries being stripped onto the ground

installed yearly in increasing numbers. The cherries (em côco) already dried naturally do not require so long to dry as the ripe and green ones. The method on the drying yards consists of heaping the cherries every 24 hours and spreading them again. This is at night or in case of rains, at which times the heaps are covered with tarpaulins. After the cherries are thoroughly dried, and known as em côco, they are taken to the storage bins (tulhas) for hulling, although they may be stored for months in the husks. In the hulling process, they are carried by mechanical devices; first to the ventilator, where a current of air removes the leaves, twigs, and

other extraneous matter. After this winnowing, they go to the hulling plant, which removes the dried hull and parchment, and from there they are carried to another winnowing machine and thence to the picker, which separates the grains by weight and, to a certain point, by form. When they have passed the picker, they are taken to the separator by which the grains are separated into certain types, varying according to size.

WET METHOD

The bulk of Brazilian coffee is prepared by the dry method described above; there is, however, some coffee prepared by the wet method. The treatment is much the same as in the dry method up to the first washing, except that this method is suitable for ripe

FIGURE 9.—Coffee conducted by water to drying ground

cherries only. Instead of being conveyed directly to the drying yards after the first washing, the ripe and green cherries may be floated off by water to the depulping machine. There the outer skin and pulp are removed, the husks and pulp being useful as a fertilizer. During the depulping process the green cherries (unhulled) are removed and carried to the yards for drying by the dry method. After the depulping process, the ripe cherries, still in the parchment, although separated into two beans by this time, are passed on to a tank of water, where they remain one or two days until fermentation takes place. They are then washed again and carried to the drying yards. There they are spread out, frequently stirred, heaped at night under tarpaulins, and also protected from showers. After about one week the coffee is considered dried and is removed to the hulling machine, in order that the parchment and some of the silver skin may be taken off.

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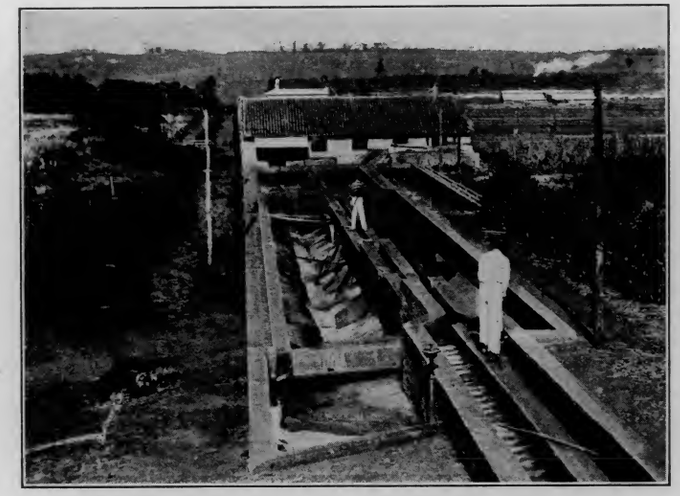

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FIGURE 10.—Coffee on drying ground, showing cars on track and dumping carts

FIGURE 11.—Stirring coffee on drying ground with spreaders

Naturally, methods of preparation vary, on the different plantations, with the quantities of water available, contour of the plantations, ideas and opinions of the managers, and other factors. The above description is based on several sources and is to serve merely to give a general idea of the usual practices.

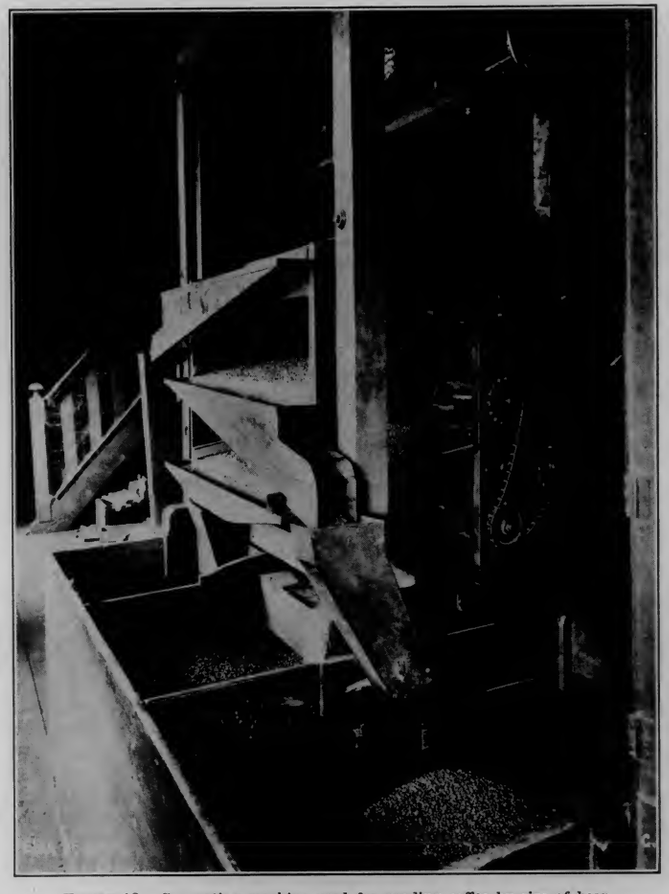

FIGURE 12.—Separating machine used for grading coffee by size of bean

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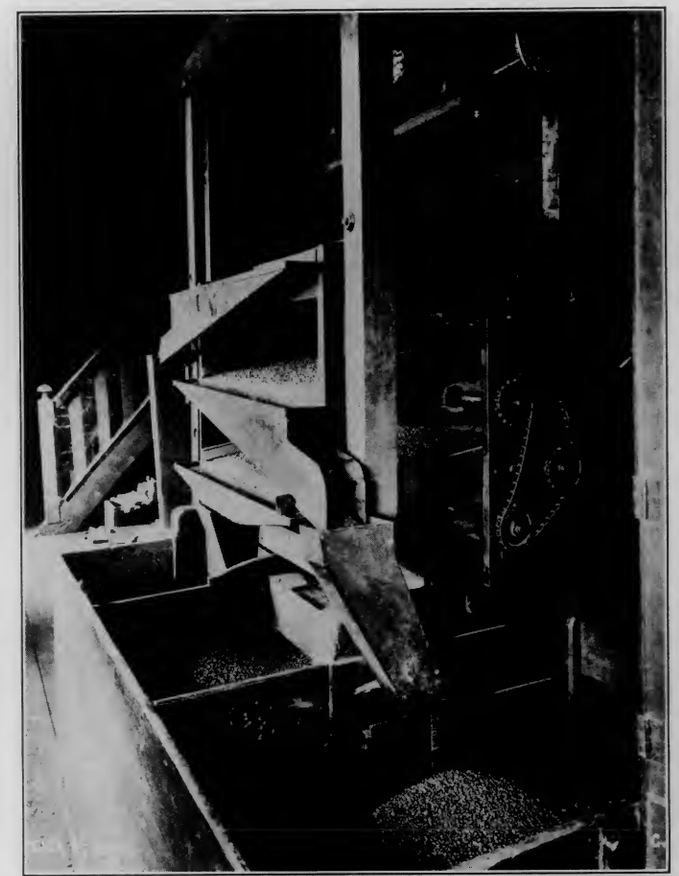

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FERTILIZERS

In Brazil there has been no serious lack of agricultural study and experiment on the part of scientists in both private and governmental institutions. The technique of growing coffee has had its full share of attention, and those who seek information on the subject have no great difficulty in obtaining it. However, the farmers themselves have been very slow, indeed, to take up new and more efficient methods. This is no greater reflection on them than on the settlers of new lands the world over; for, undoubtedly, the science of agriculture as applied by the practical farmer has always developed in proportion to the decrease in productiveness and increase in cost of the lands.

Brazil still has vast areas suitable for coffee planting, and is still, to some degree, in that "Go west, young man, and grow up with the country" stage. She is, however, very rapidly approaching the point, if she has not already arrived there, where the process of "skimming the cream" off the land is no longer economical, even from the point of view of the individual farmer who has no interest in the welfare of his descendants. The costs of transporting coffee, almost all of which is exported, over the steadily increasing distances from the new lands in the interior to the ports, together with other higher costs coincident with farming in the more remote regions, are approaching the point where they are equal to the value of the greater production of the new lands as compared with the old ones. It is, therefore, even from the point of view of immediate profits, becoming cheaper to maintain the old fazendas (plantations or farms) than to abandon them and move on to new country. Furthermore, coffee trees abandoned because they no longer produce represent not only the loss of those trees or the ground on which they are growing, but also the loss of the capital investment in the entire farm as well. Scientific farming and, more especially, the use of fertilizers is the only known way of preventing the complete decadence of a plantation.

Fertilizer production in Brazil is estimated to be about 40,000 metric tons of various kinds annually. The Minister of Agriculture estimates that there are about 25,000,000 acres under cultivation of all sorts, and that to maintain the fertility of this land it should be fertilized with 300,000 tons of nitrogen, 200,000 tons of phosphoric acid, and 300,000 tons of potash, a total of 800,000 tons, annually. It should be understood that this estimate is of the pure plant-food requirements. It is said that in the neighborhood of 90 per cent of the natural fertilizer products which are manufactured in Brazil, and which consist of bones, dried meat, skins, ash, sugar residues, coffee husks, vegetable meal, guano, and similar substances, is exported. The 20 factories which manufacture fertilizers in Brazil probably sell, in other words, some 10 per cent, or 4,000 tons, of their product locally and ship nearly all of the rest of it to the United States and Europe. The total imports into Brazil probably do not exceed 15,000 tons, the larger part of which are Chilean nitrates.

NECESSITY FOR FERTILIZATION

On the average "terra-roxa" or red-earth land, famous for its production of coffee in the State of Sao Paulo, trees continue to produce without fertilization for about 35 years. Conditions of soil, exposure, and drainage cause this term to vary widely even on the same farm, but 35 years is fairly representative. Production usually begins to fall off from the fifteenth to twentieth year and decreases steadily thereafter. The explanation of these facts lies solely in the using up of the soil. It is not a question of old age but is, rather, one of starvation; for there are many known instances where trees have been properly fed from some extraneous source, or from extremely rich soil, and have produced in large quantities for more than 100 years. The evident necessity is to put back into the soil that which it is steadily losing.

The terra roxa of Sao Paulo is not a rich soil in the usual sense of the word. As has been pointed out, the explanation of its ability to produce coffee lies rather in its porosity and depth than in its phosphate, nitrogen, and potash contents. The retention by the soil of water is extremely important. While depth and porosity are necessities to this end, humus, in which the average terra roxa is very poor, is also essential. It forms a layer of insulation on or near the surface which protects the subsoil from the too rapid absorption of the moisture by the sun's rays, and it increases the natural water-carrying capacity of the soil. The Brazilian coffee producers are gradually learning the importance of this fact, although it is by no means understood universally. In the State of Sao Paulo, with its more than 1,000,000,000 trees, it is estimated that less than 25 per cent are fertilized by organic material originating on the fazendas. Organic material consists largely of husks from the coffee beans, it being difficult to understand why some three-quarters of the growers, nearly all of whom are badly in need of humus and the elements it releases during decomposition, fail to return this natural product to the soil. The probable explanation is that very few farms are equipped with plows that could be used to turn the husks under. Since the roots of the trees come close to the surface, plows and cultivators which penetrate more than 2 or 3 inches are frowned upon. However, the husks have nearly a year in which to decompose before the ground need be cleaned for the next picking season, and as hoes are used around the trees in any case, this is hardly an adequate reason.

The husks alone are not sufficient to replace all that the soil loses each year. In the way of green fertilizers, the Brazilian agronomists who have given the subject most study recommend that "feijão de porco" (hog bean) be planted between the trees. Several other legumes and humus-supplying plants are desirable, but this seems to be the best of its kind. Animal manure contains practically all of the necessary elements of food for the trees as well as humus, is easy to apply and inexpensive, and its benefits are evident for a comparatively long term of years. The government of Sao Paulo and the agricultural societies have sought to increase its use by means of written propaganda and demonstration, but no important results are yet evident. The average farmer who keeps his animals in a large pasture year in and year out can not quite believe it is worth his while to stable them partially for the sole purpose of obtaining manure.

CHEMICAL FERTILIZERS

The use of chemical fertilizers is gradually increasing but, for the time being, is insignificant. In Sao Paulo it is estimated that some 20,000,000 trees are treated with national fertilizer and about 50,000,000 with that which is imported, a total of less than 7 per cent of the trees in that State. This does not mean that the 70,000,000 trees obtain all of the fertilizer they require, nor even the proper proportions of the various kinds needed. Despite the fact that it has been proved time and again by local agricultural schools that the right kind of use of chemicals pays large dividends, there is a pronounced prejudice against them in many districts. The prejudice has some basis in fact, since a few years ago several ignorant or unscrupulous firms sold their particular chemicals in the interior without regard for the requirements of the soil, while they promised astounding results in production. Nitrates were used where phosphates were needed, lime in place of potash, and so on, with the inevitable result that production did not increase in many cases, and actually decreased in a few. Furthermore, where the soil lacked humus, the effect of the chemicals quickly passed. The government of the State of Sao Paulo has now passed a law requiring all fertilizers sold in the State to be analyzed officially, and the companies have learned that it is poor business to sell regardless of soil requirements.

It is claimed by the representatives of the Association of Chilean Nitrate Producers that nothing is invigorated more by nitrate than are coffee trees. They agree, of course, that other chemicals should be combined with it in the proper proportions to obtain the best results, but by using it alone, especially in the Ribeirao Preto district, they cite many instances where production has increased in the ratio of from 5 to 16 milreis value for each milreis worth of nitrate used. Brazil lacks natural deposits of nitrate. To remedy this condition, the Government of the State of Sao Paulo has interested itself recently in the installation of an atmospheric-nitrogen fixation plant. At the present time (March, 1928) private companies are being asked to bid on the construction and operation of such a plant. Governmental aid in the way of liberal concessions and some capital are promised. In any case, as has been pointed out before, it is highly profitable for a large proportion of the farmers to fertilize at the present moment and with the present costs for plant, animal, and chemical materials.

EXPERIMENTAL PLANTATION RESULTS

The results obtained on an experimental plantation at Taboas, using old trees which had been completely abandoned, are quoted below. An analysis of the soil showed the following contents:

	Per cent		Per cent
Nitrate	0.002	Potash	0.050
Lime	Trace.	Phosphorus	0.57

Six thousand trees, all more than 65 years old, which were not producing more than from 40 to 75 kilos (88 to 165 pounds) of coffee per thousand trees, were divided into six equal units and treated as follows:

EFFECT OF FERTILIZERS ON OLD BRAZILIAN COFFEE TREES

Unit	Treated with—	Production, in kilos, per 1,000 trees				
		1918	1919	1920	1921	1922
1	Catalytic fertilizers	75	75	60	45	15
2	Reserved for comparison	75	45	15	-------	-------
3	20 grams magnesium sulphate and 50 grams powdered sulphur per tree	105	75	60	45	15
4	Previously with catalytic fertilizers and later with 200 kilos of nitrates	105	120	105	-------	75
5	200 kilos of bone phosphates, 150 kilos of chloride of potassium, 100 kilos of lime, and 250 kilos of Chilean nitrate	150	220	300	300	375
6	100 kilos of 18 per cent superphosphates, 100 kilos of chloride of potassium, and 250 kilos of Chilean nitrate	150	300	450	675	825

LABOR

The year 1888 saw the abolition of slavery in Brazil. Up to that time, the coffee plantations had been worked largely by slaves, Africans and their descendants. The transformation period to free labor was fraught with the gravest anxiety on the part of the large landowners. It was feared that it would be impossible to maintain their agricultural establishments. However, a few of the more progressive fazendeiros, believing in the future of a coffee industry maintained by free labor, and recognizing that immigration must be their salvation, organized the Sociedade Promotora de Immigração. Largely owing to its efforts, in 1886, from the slender income of the Province of Sao Paulo alone, 2,573 contos were expended to encourage immigration, and again in 1887, 2,473 contos. From that day to this, the importance of inducing farm labor to come to Brazil has been recognized, and large sums have been spent yearly to encourage it.

IMMIGRATION

Records of immigration were first instituted for the State of Sao Paulo in 1827, five years after the declaration of independence from Portugal, but, with two exceptions, until 1873 only immigrants of Portuguese nationality were registered. The exceptions were in 1856 and 1872; during the former 37 Spaniards, and during the latter 13 Austrians entered the State. In 1874 the first Italians came to the State, and from that year to 1904 their number greatly exceeded that of any other nationality. From 1827 through 1926, 2,230,166 immigrants entered the State; of this total, 1,104,263 came with government assistance in the way of free passage or other favors, 948,188 came spontaneously, and 177,715 were unclassified.

Before the advent of immigrants in large numbers, there had been a considerable mixture of the whites with the Negroes and the Indians among the laboring class. Since then the fusion of nationalities and races has been extreme, especially in the States of Espirito Santo, Rio de Janeiro, and Minas. This is also true in a general sense in the State of Sao Paulo when applied to the true Brazilian laborer, but it must be remembered that fazendas in Sao Paulo are, for the most part, cultivated by "colonos." These may be of any

nationality, Italians, Portuguese, and Spaniards predominating, and are of the immigrant class more recently arrived, being, consequently, of less mixed blood.

CHARACTERISTICS OF LABORERS

Compared with the North American farm laborer, the Brazilian may be said to be equally strong physically, but slower and possessing less initiative. He is likely to be more thorough, preferring to do his work patiently and completely. Taking into consideration the warmer climate and the longer hours, it is probable that he averages as much if not more work done per day than the North American. His greatest weakness is lack of education and progressiveness. It is difficult to teach him new methods, to get him to do a job quickly and roughly, and to make him "use his head." His character is good, being family loving, honest, good natured, and very loyal.

It is calculated that there are, in the State of Sao Paulo, about 250,000 effective coffee laborers. These, together with the women, children, minor unmarried workers and widowers, foremen, overseers, and administrators, make a probable total of about 1,000,000. Every year a large number of colonos abandon the fazendas; some of them are able to take up land on their own account, others go to the cities to establish themselves in their own businesses or become industrial workers, and still others return to their native lands. It is impossible to calculate the total of the first two classes, but the exact numbers of the last are known. The following table shows the percentage of immigrants who have remained in the country each year:

	Per cent		Per cent
1920	53	1924	66
1921	55	1925	66
1922	44	1926	68.4
1923	63		

Altogether, it has been estimated that about 45,000 laborers leave the coffee fazendas annually for the three reasons stated above, and it is evident that at least an equal number should come in each year. The following table shows the entries of immigrants into Sao Paulo during recent years:

1919	21,812	1923	59,818
1920	44,553	1924	68,261
1921	39,601	1925	73,335
1922	38,635	1926	96,126

These, of course, do not all go to work on the coffee plantations. The great difficulty has been to find immigrants of the true agricultural type. Labor of this sort seems to be scarce the world over, except in the Far East. The Brazilian coffee regions are no exception in this respect, although the writer was informed in 1927 by Dr. Marcella Piza, director of the Sao Paulo State Department of Labor, that, generally speaking, there is no shortage of labor on the fazendas. Most of the growers seem to think differently. Undoubtedly the truth of the matter is that the real scarcity of labor in many agricultural regions is due to competition from the new coffee districts and from other industries, rather than to an actual shortage of hands.

FIGURE 13.—Colonists' breakfast. Shows type of laborers and, incidentally, corn interplanted among coffee trees

nationality, Italians, Portuguese, and Spaniards predominating, and are of the immigrant class more recently arrived, being, consequently, of less mixed blood.

CHARACTERISTICS OF LABORERS

Compared with the North American farm laborer, the Brazilian may be said to be equally strong physically, but slower and possessing less initiative. He is likely to be more thorough, preferring to do his work patiently and completely. Taking into consideration the warmer climate and the longer hours, it is probable that he averages as much if not more work done per day than the North American. His greatest weakness is lack of education and progressiveness. It is difficult to teach him new methods, to get him to do a job quickly and roughly, and to make him "use his head." His character is good, being family loving, honest, good natured, and very loyal.

It is calculated that there are, in the State of Sao Paulo, about 250,000 effective coffee laborers. These, together with the women, children, minor unmarried workers and widowers, foremen, overseers, and administrators, make a probable total of about 1,000,000. Every year a large number of colonos abandon the fazendas; some of them are able to take up land on their own account, others go to the cities to establish themselves in their own businesses or become industrial workers, and still others return to their native lands. It is impossible to calculate the total of the first two classes, but the exact numbers of the last are known. The following table shows the percentage of immigrants who have remained in the country each year:

	Per cent		Per cent
1920	53	1924	66
1921	55	1925	66
1922	44	1926	68.4
1923	63		

Altogether, it has been estimated that about 45,000 laborers leave the coffee fazendas annually for the three reasons stated above, and it is evident that at least an equal number should come in each year. The following table shows the entries of immigrants into Sao Paulo during recent years:

1919	21,812	1923	59,818
1920	44,553	1924	68,261
1921	39,601	1925	73,335
1922	38,635	1926	96,126

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FIGURE 13.—Colonists' breakfast. Shows type of laborers and, incidentally, corn interplanted among coffee trees

The usual colono family, the parents and two or three children, will take care of from 3,000 to 5,000 coffee trees through the year, some extra labor being required at picking time. There can be no question but that the number of trees per family could probably be increased to 10,000 or more if proper cultivating machinery were introduced and the men taught how to use it. At present, nearly all cultivation is done by means of a simple, heavy-headed hoe and plenty of muscular exertion. In other words, modern agricultural methods can soon solve the problem of labor shortage up to the time when the coffee becomes ripe. Then the question becomes more serious, since no machine has yet been invented, or is likely to be invented, which will pick the crop. However, it is not as necessary to pick coffee at exactly the right time as is the case with nearly all other fruits. Usually, the season may be spread over several weeks with no harmful effect, provided the weather remains dry. Heavy winds or rains during the picking season readily knock the ripe cherries to the ground, where they may be washed away, spoil entirely, or acquire an earthy flavor. Plenty of labor to pick the crop as soon as possible decreases this danger.

COMPENSATION

Colonos are, at present, paid at the rate of from 200 to 500 milreis ($24 to $60) per thousand trees for their cultivation through the year. This cultivation consists mainly of three weedings starting from December 1, a general cleaning up before the picking season, and the spreading of the mounds of rubbish and dirt back around the trees after picking. Picking is extra and is paid for at the rate of 600 reis to 2$500 per 50 liters (from 7 cents to 30 cents per 45 quarts, dry measure) of cherries gathered. If there is a shortage of colonos, making it necessary to employ day labor for cultivation, costs are likely to be from 25 to 30 per cent higher. In some districts where labor shortage has been acute, colonos have been contracted on the "meias" system; that is, they are paid nothing for their work (including picking) in cash, but are given half of the crop.

Wherever new trees are planted it is customary to allow the colonos to plant such catch crops as cereals and beans between the rows. Naturally, they are paid in the neighborhood of 25 per cent less for the care of these trees than for the older ones where this privilege is not enjoyed. Where catch-crop planting is not allowed, separate land is often given to the colono for his private cultivation. At the Dumont fazenda, for example, 4⅓ acres of free land are allowed for each 10,000 trees cultivated.

LIVING CONDITIONS

Each colono family that remains on a fazenda is supplied with a relatively comfortable house of three or four rooms with a kitchen and running water near by, usually carried in a canal. They are nearly always given permission to maintain a pigsty, and, in some cases, allowed to keep goats, a milch cow, and a saddle animal.

The food of the colono consists of rice, beans, corn meal variously prepared, eggs, potatoes, meat, bread, and several kinds of macaroni. Sanitary conditions are comparatively good. An outstanding coffee authority, Dr. Augusto Ramos, says: "They make good society

FIGURE 14.—Coffee village, showing church, store, and colonists' houses

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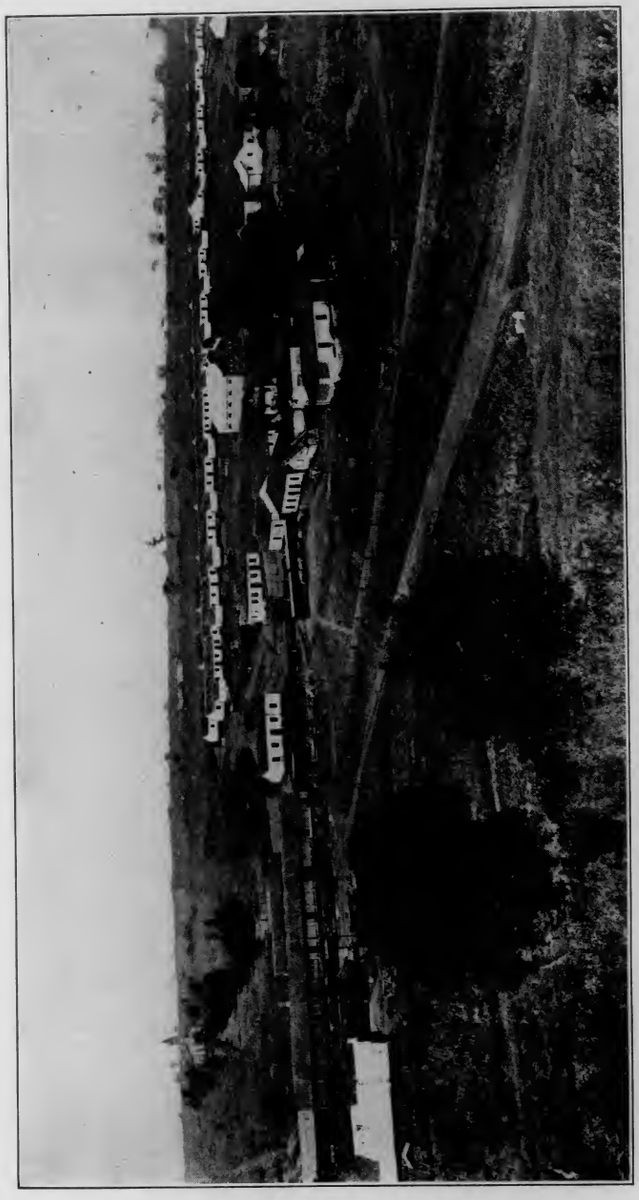

FIGURE 14.—Coffee village, showing church, store, and colonists' houses

among themselves and multiply abundantly, the girls and boys marrying early and passing on to occupy new houses on the same fazenda or on adjoining fazendas where they find work." Each family lives separately, and their houses are grouped together along little streets located on desirable parts of the farm. They are paid three times a year, or, in special cases, as often as once a month. Stores are usually kept near by from which they may draw their supplies.

Children over 7 years of age accompany and assist their fathers, the women also helping when domestic duties are finished. Unfortunately, since the children are very useful, it is not often that their parents or the fazendeiros themselves insist that they attend school.

LABOR PROBLEMS

Occasionally the colonos strike for higher wages or better treatment. These strikes ordinarily occur just before the picking season, for the obvious reason that they are more likely to be successful at such a time. According to Dr. Augusto Ramos, they are becoming less frequent every year, owing to organization among the fazendeiros for the purpose of setting wage scales.

The nomadic movement of the colonos from the older to the newer districts, where they are allowed to plant catch crops between the trees, is a serious problem. There seems to be little likelihood of stopping it other than by increasing wages in the old districts. This is, naturally, difficult to do, since the production of the older trees steadily declines. Undoubtedly, as is being very slowly realized, the solution of this problem lies in fertilization and more intensive cultivation.

PARASITES

While, like coffee in other countries, Brazilian coffee is affected by the usual number of parasites, both vegetable and animal, only one of them is, at present, seriously dangerous. The others have been carefully studied and methods for their eradication and control discovered. Detailed scientific data on them are found in many of the best English, French, or Portuguese biologies.

STEPHANODERES COFFEÆ HAG.

This insect, more commonly referred to in Brazil as "the coffee plague," has, since the middle of 1924, been the cause of the gravest concern to the fazendeiros of the State of Sao Paulo. In May of that year an important planter near the city of Campinas notified the secretary of agriculture that what seemed to be an unknown parasite was causing great damage on his and several adjoining fazendas. Two days later an expert was sent to the infected zone and reported the situation very serious. He immediately fumigated some of the picked coffee with carbon bisulphide, and after 24 hours observed that the insects were dead. Returning to Sao Paulo the expert was able to identify the parasite as of the Stephanoderes, but it was not until later, after Drs. Arthur Neiva and Costa Lima were called from Rio de Janeiro, that it was found to be the *Stephanoderes coffeæ* Hag., the same insect which had ravaged the plantations of Sumatra and Java.

By June 10 it had been discovered that at least 10 municipalities centering around Campinas were infected. A representative commission of important men was appointed to study the situation, while the Commissão de Estudo e Debellação da Praga Cafeeira was organized under the direction of Doctor Neiva, Dr. Navarro de Andrade, and Dr. A. de Queiroz Telles.

After much discussion of the question of burning all trees in the affected area, other means of combatting the plague were agreed upon, and men were sent to 104 municipalities to estimate the extent of the danger. Twenty-eight municipalities were proved infected or suspected, some confusion arising with regard to the "caruncho das tulhas," which resembles the dangerous Stephanoderes. Study revealed that the true "plague," while it penetrated other kinds of seeds, did not reproduce in anything other than coffee. It was also found that it could not live more than 100 days outside of the coffee bean. With these facts known, the following means of combatting the evil were instigated:

TREATMENT

1. Recleaning, that is, gathering all berries from the branches, on the ground, and those caught in holes or rotten spots in the trees and destroying or fumigating them.
2. Fumigating in air-tight rooms all picked coffee, using 300 cubic centimeters of carbon bisulphide to each cubic meter of space.
3. Drying all coffee on drying grounds whether before or after being washed.
4. Fermentation or burning of all husks and other residue before using for fertilization.
5. Fumigation of all clothes and effects of laborers coming from infected zones.
6. Fumigation of all empty bags transported in the State.
7. Supervision of transport of all coffee, plants, or any objects which might transmit the plague.
8. Destroying all abandoned coffee trees.

Laws were passed which gave the representatives of the State full authority to carry out these measures without regard for local objection on the part of the growers. Propaganda was disseminated through the schools, cinemas, newspapers, and other mediums, the chief difficulty experienced being in teaching the difference between the relatively harmless "caruncho das tulhas" and the Stephanoderes.

GOVERNMENT ACTION

The commission, for the purpose of demonstration, took over one of the worst farms, where some 90 per cent of the trees were infected. To-day less than 1 per cent of these trees suffer from the parasite. Some 3,000 air-tight fumigatory houses were built. Prompt steps were taken to prevent profiteering on the part of the companies selling carbon bisulphide. Eighty-nine points were established in the State where empty sacks had to be fumigated, a charge of 25 reis (about ⅓ of a cent) being made for this service. The railroads cooperated, and some 52,000,000 sacks were treated in 1927.

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Zones were created, with inspectors for each, who personally supervised all operations and personally closed and opened the various fumigatory houses every 24 hours. They were provided with automobiles and horses for personal transport to increase their effectiveness. Generally speaking, every possible precaution was taken, the result being that, as the famous German scientist Escherich puts it, "I do not know of a single other case where, in so short a time, there has been executed such a scientific and practical work as this"; and as Professor Friederichs, who was chosen by the Netherland Government to extinguish the same plague in Java, says, " * * * succeeding with the greatest efficiency in dominating the plague."

EXTENT OF INFECTED AREAS

The nature of the Stephanoderes is such that the pest can never be eliminated entirely. If untiring efforts are made to keep it down it will not be a serious handicap, although it is practically certain that it will gradually spread over the entire country. At present it is dominated but not extinguished. It is estimated that, up to June 1, 1928, approximately 3,000 fazendas in 23 municipalities were infected, as shown by the following table:

COFFEE TREES AFFECTED BY STEPHANODORES UP TO JUNE 1, 1928

Municipalities	Total number of trees	Number of properties to June 1, 1928	Municipalities	Total number of trees	Number of properties to June 1, 1928
Amparo	17,960,980	499	Mogy-Guassu	1,994,000	3
Atibaia	4,861,106	144	Mogy-Mirim	7,633,510	228
Araras	7,000,000	15	Pedreira	1,690,405	53
Braganca	13,371,311	136	Piracaia	3,284,503	4
Cabreuva	1,574,000	12	Piracicaba	8,697,400	5
Campinas	24,667,629	658	Rio Claro	10,012,000	5
Espirito Santo do Pinhal	11,300,000	1	Sao Joao da Boa Vista	9,853,800	1
Indaiatuba	2,849,436	32	Serra Negra	8,915,000	2
Itapira	9,306,000	8	Villa Americana	478,700	20
Itatiba	8,323,421	341	Itu	8,302,000	12
Jundiahy	8,005,454	339			
Leme	2,277,000	4	Total	182,417,195	2,738
Limeira	10,059,540	216			

INTRODUCTION AND IDENTIFICATION

There has been considerable controversy on the question of whether or not the Brazilian *Stephanoderes coffeæ* Hag. is the same insect which caused such enormous damage in the East Indies. Brazilian authorities, in conjunction with several famous European scientists and with Dutch entomologists in Java, have pronounced it to be identical.

It is believed that it was introduced into Brazil in 1913. It is stated in the writings of Arthaud-Berthet, a famous French biologist, that he recognized the insect in some seeds which a fazendeiro near Campinas had imported from Africa. The seed was ordered destroyed, but the present version of the story in Campinas is that it was simply thrown into a garbage can. Since the garbage is often used as fertilizer on the coffee plantations, the deduction is that these particular seeds are the source from which the plague sprang.

LAW OF JANUARY, 1929

A recent regulation affecting the control of the insect is as follows:

ARTICLE 1.—The embarkation of coffee on the railways shall be prohibited to all coffee growers in the municipalities infested by the "Stephanoderes hampei" who refuse to clean their coffee plantations, clean coffees already gathered, or employ other processes determined by the inspection service of the Instituto Biologico de Defesa Agricola e Animal to combat the coffee plague, in accordance with the legislation in force.

Paragraph 1.—The processes referred to in the present article include prophylactic picking and the use of white cotton sacks.

Paragraph 2.—In compliance with the present article, the dispatch of coffee at the railway stations shall depend upon authorization from the inspection service of the Instituto Biologico de Defesa Agricola e Animal to the respective chiefs of traffic.

ARTICLE 2.—The inspection service, in compliance with the law and the present regulations, shall be in charge of the following officials of the Instituto Biologico: (*a*) Regional inspector of the zone; (*b*) fiscal inspector; (*c*) inspectors in charge of verification service; (*d*) subdirector of the vegetal division.

Paragraph 1.—The duties of the regional inspector shall be to report nonexecution of the measures exacted by the law and these regulations, such infractions being successively verified by the fiscal inspector and the inspectors in charge of verification service.

Paragraph 2.—The duties of the subdirector of the divisão vegetal shall be to make necessary verifications to settle the disagreements arising between the inspectors in charge of the verification service and the proprietors of coffee plantations.

ARTICLE 3.—The infraction of the law of the present regulations may be reported by anybody to the director of the Instituto Biologico de Defesa Agricola, who will receive such information secretly and will then proceed with the necessary authentication.

ARTICLE 4.—The refusal of authorization to ship coffees, referred to in paragraph 2 of article 1, shall be communicated to the infractor by registered letter, signed by the inspector of the regional zone.

ARTICLE 5.—As regards refusal of authorization to ship coffee, there shall be recourse for a change of the decision, within a period of eight days, to the secretary of agriculture, industry, and commerce, through the director of the Instituto Biologico de Defesa Agricola e Animal, who will forward the petition with the necessary information, together with his opinion on the matter, to the aforementioned secretariat.

ARTICLE 6.—Before the secretary of agriculture, industry, and commerce gives his decision on the petition mentioned in the preceding article, he shall appoint three persons of recognized ability to make investigations concerning this infraction and present their respective report within a period of 10 days.

ARTICLE 7.—As soon as the infractor has complied with the terms of the law and the present regulations he shall be conceded authorization to ship his coffees.

ARTICLE 8.—For checking the matter of cleaning of plantations and prophylactic picking a schedule shall be observed, organized annually by the Instituto Biologico de Defesa Agricola e Animal, determining maximum amount of fruit in each section, after examination of six coffee trees, and minimum amount of sections (talhões) to be examined on each plantation.

ARTICLE 9.—Examination relative to expurgation of coffee already gathered shall be made on the drying grounds.

Paragraph 1.—In case five berries are found containing live insects, the proprietor shall be compelled to clean his coffee again.

Paragraph 2.—If, after again cleaning the coffee, live insects are found, the proprietor shall be subject to suspension of shipment of the coffees cleaned.

ARTICLE 10.—The cleaning of coffee plantations made during one year shall serve as a concession of the quota of embarkation during the coming year, if other instructions referring to the harvest have been carried out.

ARTICLE 11.—For the execution of the law and the present regulations the executive power shall open the necessary credits.

ARTICLE 12.—Cases omitted in the present regulations shall be decided upon by the secretary of agriculture, industry, and commerce.

ARTICLE 13.—All dispositions to the contrary are hereby revoked.

MANAGEMENT OF FARMS

The majority of fazendeiros (planters), particularly in the States of Sao Paulo and Rio de Janerio, employ managers for their estates. It is true that many of the smaller places are operated by the owners or their sons, or jointly by the family, but it is much more usual to find a man on the place who may be left in charge while the family is away. He is known as the "administrador," and has one or more "fiscaes" (foremen) under his direction. On the average fazenda with 100,000 trees planted, there will be an administrator and two foremen. It is, however, the almost invariable custom of the owner and his family to return to the fazenda during the picking season. It is a period of great activity. The size of the crop is determined, books are gone over, inefficient employees are weeded out, and important decisions of many kinds are made. During the rest of the year the farm life is fairly dull, and the average owner moves into his house in a near-by town or in the city of Sao Paulo. In Espirito Santo and Minas Geraes, where the fazendas are smaller, the owner-operator is much more common. He is less of the gentleman-farmer type and is likely to work harder and think less of the city, although the owner of even a small coffee fazenda anywhere in Brazil is, or soon becomes, something of an "aristocrat."

The remuneration of the managers naturally varies greatly. In Sao Paulo it is customary to plan for administrative salary costs of about 10 contos (roughly $1,200) per annum for a plantation of 100,000 trees; of this 5 contos go to the administrador and 2½ contos to each of the foremen. However, this serves more as a working basis on which to start salary negotiations than as a fixed amount. Good administradors are hard to get, particularly for the smaller fazendas, and they must be either well paid or dispensed with. On places where there are less than 100,000 trees they receive an average rate of more than 5 contos per 100,000 trees, while on the large estates, say on those that have 500,000 trees planted, they receive less than 25 contos a year. Good men for reasonably large establishments can usually be found for 10 or 12 contos. Naturally, the managers on the very large estates are very important and receive high salaries, although the entire scale is much below the United States standard. Many of the owners pay bonuses to their administradors after a good year.

NATIONALITY OF PRODUCERS

Other than for the State of Sao Paulo no data are available as to the nationality of the owners of the coffee plantation. The following table is taken from the State census of 1925:

NATIONALITY OF SAO PAULO COFFEE PRODUCERS

Nationality	Number of properties	Number of trees planted	Nationality	Number of properties	Number of trees planted
Brazilian	25,566	716,118,865	British		16,620,000
Italian	11,632	166,171,228	Austrian	164	2,967,343
Portuguese	1,521	33,629,891	Various	438	15,451,663
German	617	20,771,404			
Spanish	1,151	17,804,061	Total		989,534,455

TRANSPORTATION FACILITIES

TRANSPORTATION TO RAILROADS

While it is true that Brazil is a vast new country and is seriously in need of improved transport facilities generally, the coffee districts do not suffer from their lack. In the first place, the area in which coffee is grown is, for the most part, close to the coast; and in the second place, since coffee has for a great many years been the principal export product of the country, railroads and highways have been steadily constructed and improved in the zones where the "green gold," as coffee is sometimes spoken of, flourishes.

Each year an increasing number of automobile trucks, which are largely of United States manufacture, are sold in the interior. One of their chief uses is to transport coffee from the fazendas to the railroad. A few are used on the fazenda itself to bring the crop from the trees into the drying grounds, but for the most part this work is done by mule-drawn, or even oxen-drawn carts and wagons. Just as the motor truck and tractor have by no means superseded the horse for general farm work in the Middle Western States of the United States, so does the little Brazilian mule persist on the fazenda. The cost of maintaining him in a land where pasture flourishes the entire year is next to nothing; he is highly mobile over any kind of country, and he has a variety of uses not possible to motor trucks.

On two or three of the very large plantations in Sao Paulo, narrow-gauge private railroads have been run from the nearest trunk line to key points on the place. Such an installation is practicable, of course, only on the largest fazendas; the capital outlay is high, and the railroad is a necessity only during the few weeks of the picking season. As mentioned above, many motor trucks are used for fazenda-to-railroad transport, but this applies more particularly to the State of Sao Paulo. In Minas Geraes, Rio de Janeiro, and Espirito Santo, roads are much less common, mules and oxen being called on for most of the work. In fact, much coffee is still transported to the railroads in those States by pack trains.

RAILWAY SYSTEMS

An inspection of the railroad map of Brazil proves that there is no lack of adequate facilities to bring the coffee down to the ports. The producing area in Sao Paulo is covered with a network of main and branch lines, as is the case in Rio de Janeiro. There are, apparently, gaps in the systems in Minas Geraes and Espirito Santo, but a close study of these States shows that coffee has been planted near the railways, or that the railways have been run through the coffee country, as the case may be. There would undoubtedly be more new planting if the railroads were extended in these States, but at present the greater part of it is taking place in the northwestern, western, and southwestern parts of Sao Paulo. In the northwest a few branch lines extending out from the Noroeste Railroad are needed, while in the west and southwest new lines are already being constructed, and others are projected.

SAO PAULO RAILWAY

In Sao Paulo there are 14 railroads, including tributaries of the main lines, that carry coffee all or part of the way from the interior down to the city of Sao Paulo. The Sao Paulo Railway, which links the city of Sao Paulo with Santos, has often been likened to the throat of a funnel. There is no other rail communication between the port of Santos and the interior. An extension of the Sorocabana Railroad down to the port was surveyed several years ago and is now under construction from Mayrink to Santos. This will not materially change the situation, since shipments to Santos on the Sorocabana Railroad would also be restricted.

In the early stages of coffee defense, one of the strongest arguments in its favor was that restriction of entries into Santos was a simple matter, owing to the unique position of the Sao Paulo Railway. Coffee defense is now organized and established completely enough to make this argument of little importance, as may be seen by the fact that the shipment of all coffee on any railroad to any point in Sao Paulo is carefully governed.

A considerable part of the route from Sao Paulo to Santos consists of a cableroad down the steep mountain range. Occasional delays in the service have been caused by the breakdown of the cables, which have in turn caused excitement in the market through fear that the Santos stocks might become depleted before repairs could be made. The possibility of a serious breakdown is remote, however, owing to the fact that this railroad is better maintained, probably, than any other in the world. Almost perfect maintenance has been made possible by the large profits earned. Further, another cable road parallel to the first and operated by separate mechanisms is always ready to be put into immediate operation. Probably nothing short of an earthquake or deliberate destruction could wreck the service entirely. Even then, the good automobile road now in existence could be pressed into service for motor-vehicle transport. There has occasionally been a shortage of cars, due to port congestion at Santos, but at the present time Santos loading and discharging facilities are sufficiently improved to avoid this danger.

Some fear was expressed at the beginning of the picking of the 1927–28 crop, the largest in Brazil's history, that the railroads would not be able to cope with the transport problems. There was an old State regulation in Sao Paulo which prohibited the railroads from carrying coffee in other than closed cars. When the situation became acute, late in 1927, a new regulation was passed permitting coffee to be carried in open cars, or gondolas, if properly protected with canvas tarpaulins. The congestion was relieved, and at the present time, although the railroads are kept busy, they are able to handle the traffic without undue strain.

RAILWAYS TO OTHER PORTS

There are two principal railroads which come into the port of Rio de Janeiro and carry nearly all of the coffee to be sold in that market. These are the Leopoldina and the Central do Brasil, on which no serious congestion is felt. A considerable amount of coffee also enters this port via coastwise steamers from the north.

The port of Victoria in Espirito Santo is served by the Leopoldina Railroad from the south, and by the Victoria and Minas Railway from the north. In this State there are also some 300 kilometers (1 kilometer is equivalent to 0.6214 mile) of developed waterways for small-draft boats, parts of which are used for coffee transport.

PORT FACILITIES AND MARITIME TRANSPORTATION

In Santos, Rio de Janeiro, and Victoria, the commissarios and exporters maintain warehouses in which to receive coffee sent down from the interior. Under the most favorable circumstances it is

FIGURE 15.—Weighing coffee in warehouse of private company

handled only twice; once from the railroad stations to the exporter's warehouse, and again from the warehouse to the docks. More commonly, there is the intermediate step of transporting from the commissario's warehouse to that of the exporter. Usually the warehouses are private and do not make up an integral part of the port installations. In Santos, however, a concessionary company maintains warehouses of the ordinary kind where the coffee may be "machined," and also special warehouses for the deposit of shipments for prompt embarkation (less than 10 days).

In Rio de Janeiro, coffee which arrives via the Leopoldina Railroad may be transported from the stations to the docks in the same railroad cars in which it has come from the interior. All other shipments must be moved in small mule carts or motor trucks. In Vic-

SAO PAULO RAILWAY

In Sao Paulo there are 14 railroads, including tributaries of the main lines, that carry coffee all or part of the way from the interior down to the city of Sao Paulo. The Sao Paulo Railway, which links the city of Sao Paulo with Santos, has often been likened to the throat of a funnel. There is no other rail communication between the port of Santos and the interior. An extension of the Sorocabana Railroad down to the port was surveyed several years ago and is now under construction from Mayrink to Santos. This will not materially change the situation, since shipments to Santos on the Sorocabana Railroad would also be restricted.

In the early stages of coffee defense, one of the strongest arguments in its favor was that restriction of entries into Santos was a simple matter, owing to the unique position of the Sao Paulo Railway. Coffee defense is now organized and established completely enough to make this argument of little importance, as may be seen by the fact that the shipment of all coffee on any railroad to any point in Sao Paulo is carefully governed.

A considerable part of the route from Sao Paulo to Santos consists of a cableroad down the steep mountain range. Occasional delays in the service have been caused by the breakdown of the cables, which have in turn caused excitement in the market through fear that the Santos stocks might become depleted before repairs could be made. The possibility of a serious breakdown is remote, however, owing to the fact that this railroad is better maintained, probably, than any other in the world. Almost perfect maintenance has been made possible by the large profits earned. Further, another cable road parallel to the first and operated by separate mechanisms is always ready to be put into immediate operation. Probably nothing short of an earthquake or deliberate destruction could wreck the service entirely. Even then, the good automobile road now in existence could be pressed into service for motor-vehicle transport. There has occasionally been a shortage of cars, due to port congestion at Santos, but at the present time Santos loading and discharging facilities are sufficiently improved to avoid this danger.

Some fear was expressed at the beginning of the picking of the 1927–28 crop, the largest in Brazil's history, that the railroads would not be able to cope with the transport problems. There was an old State regulation in Sao Paulo which prohibited the railroads from carrying coffee in other than closed cars. When the situation became acute, late in 1927, a new regulation was passed permitting coffee to be carried in open cars, or gondolas, if properly protected with canvas tarpaulins. The congestion was relieved, and at the present time, although the railroads are kept busy, they are able to handle the traffic without undue strain.

RAILWAYS TO OTHER PORTS

There are two principal railroads which come into the port of Rio de Janeiro and carry nearly all of the coffee to be sold in that market. These are the Leopoldina and the Central do Brasil, on which no serious congestion is felt. A considerable amount of coffee also enters this port via coastwise steamers from the north.

The port of Victoria in Espirito Santo is served by the Leopoldina Railroad from the south, and by the Victoria and Minas Railway from the north. In this State there are also some 300 kilometers (1 kilometer is equivalent to 0.6214 mile) of developed waterways for small-draft boats, parts of which are used for coffee transport.

PORT FACILITIES AND MARITIME TRANSPORTATION

In Santos, Rio de Janeiro, and Victoria, the commissarios and exporters maintain warehouses in which to receive coffee sent down from the interior. Under the most favorable circumstances it is

FIGURE 15.—Weighing coffee in warehouse of private company

handled only twice; once from the railroad stations to the exporter's warehouse, and again from the warehouse to the docks. More commonly, there is the intermediate step of transporting from the commissario's warehouse to that of the exporter. Usually the warehouses are private and do not make up an integral part of the port installations. In Santos, however, a concessionary company maintains warehouses of the ordinary kind where the coffee may be "machined," and also special warehouses for the deposit of shipments for prompt embarkation (less than 10 days).

In Rio de Janeiro, coffee which arrives via the Leopoldina Railroad may be transported from the stations to the docks in the same railroad cars in which it has come from the interior. All other shipments must be moved in small mule carts or motor trucks. In Vic-

toria, this traffic is handled with carts and trucks or by means of barges.

Once the coffee has arrived on the dock, there are two methods for its embarkation. The older system is to turn it over to a lighterage company, which carries it out to the ship and loads with the ship's tackle; the more modern method being to load directly into the ship from the docks, with either the port cranes or special apparatus. In Rio de Janeiro no other steamship company than the Government-owned Lloyd Brasileiro is permitted to load in this way. It is common sight to observe mail boats or large passenger ships of competitive, foreign-owned lines tied up to the docks, busily loading from lighters, while the dock cranes stand idle and the railroad tracks on the docks are empty. In all other ports, with the exception of Santos, only the lighterage system is used.

FIGURE 16.—Loading coffee into ship's hold at Santos

In Santos all embarkation is accomplished by means of dock hoists or automatic loaders except in case of emergency. The automatic loaders, belonging to the concessionary Cia. Docas de Santos, function rapidly and efficiently. Carts and trucks haul the coffee to a manhole in the street outside the inclosure of the dock warehouses. The bags are dropped down these holes, where they fall on a moving belt which carries them underground for a short distance, then elevates them to the height of the eaves of the warehouses, under which they are carried until they are opposite the hold of the ship. An apparatus which may be moved along the docks on a track carries them by means of another endless belt to the mouth of the ship's hold, into which they are dropped. Stevedores then stow them securely. The coffee may also be stored in the companies' warehouses, some of which are inside the dock inclosure, others across the street, and carried by the same automatic system from these to the ships.

There are about 700 linear meters (2,298 feet) of the docks equipped with this apparatus, while 300 meters more are being prepared. When the work is concluded there will be six warehouses inside the inclosure and three outside, the installation having a total loading capacity of 6,000 bags per hour.

Costs of loading.—It is interesting to note the comparative costs of embarkation in the various ports. For the same kind of service, that is, transport from the exporter's warehouse to the docks and loading on board ship, inclusive of the necessary lighterage charges in Rio de Janeiro and Victoria, but not in Santos, the following charges per bag were effective in February, 1928:

COSTS PER BAG OF EMBARKATION OF BRAZILIAN COFFEE

Port and item	Brazilian currency	United States currency
Santos:		
Transport to docks	0$500	$0.06
Transport from docks to ships' holds by Cia. Docas de Santos	(1)	(1)
Stevedores	$120	.01
Total	$620	.07
Rio de Janeiro:		
Transport to docks	$580	.07
Unloading carts and delivering to stevedores	$090	.01
Dock tax	$060	.01
Stevedores, including lighterage	$614	.07
Total	1$344	.16
Victoria:		
Transport to docks and delivery to stevedores	$300	.04
Stevedores and lighterage	$640	.07
Total	$940	.11

[1] No charge.

Nationality of vessels.—The Lloyd Brasileiro steamship company has made a strong effort during the last few years to obtain the business of the coffee exporters. After the war American ships held the largest share of this business, only to be superseded by English lines, who have, in turn, lost first place to the Lloyd Brasileiro company. This has been accomplished despite the loyalty of American importers (who own the coffee from the time it is embarked in Brazil) to American lines. The present freight rate on cargo boats and mail boats from Santos to New York is, respectively, 60 and 65 cents per bag.

REGULATORY WAREHOUSES

SAO PAULO

In accordance with the coffee-defense plans of the various States, regulatory warehouses have been placed at strategic points along all of the railroads leading to the ports. In Sao Paulo, where the system has been most highly developed, the warehouses were originally built by the Federal Government and were purchased by the Sao Paulo State Government in December, 1924, and later purchased by the Coffee Institute, but they are now operated by the

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railroads under the administration of the Coffee Institute. The railroads are paid, at stipulated rates, for this service from funds accumulated as a result of the tax of 1 milreis gold (about 55 cents) per bag of coffee transported through the State. Incidentally, the railroads are responsible for the collection of this tax at the port of destination, for which service they receive 1 per cent of the total sum collected. The following table indicates the warehouses built or purchased by the institute and directly administered by it. The capacity of some of these warehouses is said to have been increased above the figures shown below; the writer has not been able, however, to obtain later information than that indicated.

	Capacity in bags		Capacity in bags
Osaco (Lapa)	500,000	Araraquara	300,000
Ityrapina	750,000	Campo Limpo	600,000
Sao Carlos	480,000	Braz	500,000
Rincao	750,000	Ribeirao Preto	500,000
Campinas	500,000		
Casa Branca	500,000	Total	5,380,000

When it became evident that this space would not be sufficient to handle the 1927–28 crop, plans were made to increase the capacity of these warehouses and build new ones. Some building contracts had already been let by the institute before it was realized that there was not enough time left, before the crop would be shipped, to complete the extensive building program necessary. The railroads could refuse to dispatch further coffee after the warehouses were filled, but this would make it necessary for the farmers to hold their product on the fazendas, which are not for the most part equipped with suitable storage buildings. Furthermore, it was and is very difficult for the farmer to obtain credit on coffee still held on the fazenda.

A simple solution of the problem was thought of and put into practice. The institute authorized several private warehousing firms in the city of Sao Paulo and in Campinas to act in the same capacity as the regular warehouses, but under fiscalization. Permission was given the growers to dispatch coffee to any of these authorized establishments, it being released from them for shipment to Santos in the same chronological order and ratios as from the actual regulatory warehouses. Approximately 11 private companies are handling this business, all but one of them being located in the city of Sao Paulo. This scheme has proved to be highly practicable. One of its best points is that bankers are more inclined to advance money against the city of Sao Paulo warehouse receipts than they are against those in the interior.

MINAS GERAES

As Minas Geraes has no seaport, all of its crops must pass through either Sao Paulo, Rio de Janeiro, or Espirito Santo to be exported. Regulatory warehouses have been established at the following places:

	Estimated capacity, bags		Estimated capacity, bags
Cysneiros, Minas Geraes	250,000	Campinas, Sao Paulo	500,000
Cruzeiro, Sao Paulo	550,000	Casa Branca, Sao Paulo	100,000
Barra Mansa, Rio de Janeiro	200,000	Ribeirao Preto, Sao Paulo	10,000
Rio de Janeiro, Federal district (2)	700,000	Victoria, Espirito Santo	
		Total	2,310,000

The warehouse listed at Cysneiros is one of a series of warehouses built in the State of Minas Geraes. The capacities of the others are not known.

For those located in the States of Sao Paulo, Rio de Janeiro, and Espirito Santo, arrangements have been made with the respective State governments. The several warehouses in the Federal district (the port of Rio de Janeiro) are contracted for in much the same way as the Sao Paulo institute has done. Private firms in Rio de Janeiro own and operate the warehouses under the direction of the Minas Geraes government.

RIO DE JANEIRO AND ESPIRITO SANTO

The State of Rio de Janeiro, like Sao Paulo and Minas Geraes, contracted with private firms for warehousing coffee. One of these is located in Nictheroy, which is across the bay from the city of Rio de Janeiro. Contracts were made with seven firms in the city proper for this purpose. It has not been possible to obtain data as to the total available capacity of these various establishments. The State of Espirito Santo also maintains a warehouse of this kind in the city of Rio de Janeiro, as well as one at Victoria, her principal port. Although it is possible to ship coffee from either Minas Geraes or Espirito Santo via the Leopoldina Railway to Nictheroy, a regulation has been passed which prohibits the railroad from dispatching coffee by this route. It must all be consigned to one of the authorized warehouses in the city of Rio de Janeiro. It has also been decreed that coastwise entries of coffee into the port of Rio de Janeiro must go to special warehouses, from which they may be released on the open market only in accordance with the regulatory measures.

FINANCING COFFEE

Lack of capital has always been one of the most serious handicaps to Brazilian development, particularly in the realm of agriculture. Where there was, and still is, comparatively little available cash, it is natural that banks should be slow to make long-term loans. Until very recently there has been no genuine system of agricultural bank credit, and that which exists to-day is by no means adequate.

FINANCING BY COMMISSARIOS

In the early days of the coffee industry, a peculiar financial system developed. It was necessary for the growers to appoint agents in such markets as Santos and Rio de Janeiro to receive and dispose of their crops. The functions of the commissario, as the agent is known in Brazil, slowly developed until he became the city agent of the fazendeiro for every possible kind of service. Besides forwarding supplies and selling the crop, he often housed, fed, entertained, and even chaperoned both the farmer and many of his numerous relatives when they were in the city. Furthermore, as the banks would seldom lend money to the farmer, it became the commissario's duty to supply him with funds for current expenses, new planting, and improvements. As a general practice, to obtain this capital the commissario was permitted

simply to overdraw his current account with the bank, although he often borrowed on either an indorsed or an unindorsed note, rarely giving any other guaranty. This system worked well as long as prices were high enough, exchange was stable enough, and crops were large enough to allow the commissario to make a profit. It was a system of personal credit rather than true agricultural bank credit. It was overexpanded, and, as was inevitable, hard times caused it to break down, the abolition of slavery giving impetus to that result.

The present-day system is little changed. The banks still are reluctant to make long-term mortgage loans on the farms, and they are not in a position to advance money on an unproduced or produced crop except under special circumstances. It is, therefore, necessary for the commissario to borrow from the bank, passing the money along to the grower for his current needs. A common system is for the grower simply to send his bills to the commissario to be paid. This the commissario is willing to do to the extent of about 60 per cent of his estimate of the value of the coming crop. He usually charges the grower interest at 12 per cent per annum on these advances, sometimes paying even a higher rate to the bank, from which it is still common for him to borrow against a simple promissory note. One would naturally expect that he would hold some sort of mortgage against the fazenda, or would at least have a written agreement with the grower to the effect that his crop would not be consigned to anyone else; but, more often than not, no such document is passed. He still looks after every conceivable kind of business, personal or otherwise, for the man in the interior, but his methods are less haphazard and much more businesslike than they were in the early days.

The commissario sells to the exporter on a 30-day cash basis, a discount at the rate of 6 per cent per annum being allowed on payments made in less than 30 days. The exporters receive cash against shipping documents from the foreign purchaser. This transaction is handled as follows: When a foreign purchaser accepts by cable the offer of an exporter, he indicates the name of the local bank, in New York or London, for example, on which the exporter is to draw. The exporter, as a general rule, immediately sells the amount of the bill, in pounds sterling or dollars, to one of his banks in Rio de Janeiro or Santos. In other words, he buys milreis to the amount of the bill, for delivery at the time he ships the coffee, thereby avoiding any risk of exchange fluctuation. Then, when he has delivered his coffee on board ship and obtained his bills of lading, he draws a 90-day sight draft on the London or New York bank payable to the local bank to which he has previously sold his dollars or pounds sterling, and delivers the draft and shipping documents to that bank. The bank pays him cash in milreis and forwards the draft for collection.

FINANCING BY PRIVATE INTERIOR BANKS

As has been indicated above, banks in general are reluctant to make mortgage loans on agricultural properties. This is especially true of those located in the interior. Deposits are generally small, it usually being necessary for the parent banks in the cities to keep

their branches supplied with money, with the consequent result that only quick loans, which will not "freeze" their limited capital, are looked on with favor. There are, it is true, especially in the State of Minas Geraes, a few private banks that make an effort to obtain agricultural-mortgage business, even for terms as long as five years, but their total capitalization is small. Furthermore, the interest rates they demand are high, sometimes being 1½ or even 2 per cent a month. They are able to accommodate fazendeiros located well back in the interior who have little opportunity to visit the cities or are unknown to the city banks. Probably natural diffidence about approaching the larger banks is an important factor. This is not as true of the States of Sao Paulo and Rio de Janeiro as of Minas Geraes and Espirito Santo, since communication in the former States is easier, and the fazendeiros as a class are more cosmopolitan. In general, it may be said that coffee plantations in Brazil are not mortgaged to any great extent and that private interior banks are not a vital factor in the industry.

FINANCING BY STATE BANKS

It is only recently—during the last four years, in fact—that the various State governments have taken an active part in financing the growers. Naturally, this has been brought about by the results of coffee defense, particularly of the record 1927–28 crop. From the time when, under the Bernardes régime, the basis of defense was changed from the plan of Government purchase and withdrawal from the market of all surplus stocks to that of Government restriction of entries into the ports, thereby causing the growers themselves to carry their part of the load, it has been evident that action would have to be taken to assist the fazendeiro financially.

As will be remembered, Sao Paulo was the first State to take definite steps in this direction. The Instituto de Café (Coffee Institute) of that State, with the guarantee of a 1 gold milreis (about 55 cents) tax on each bag of coffee, borrowed £10,000,000 in England. (It is understood, of course, that the institute is, in effect, a Government department.) These funds were for the purpose of building and maintaining the regulatory warehouses and all of the defense apparatus, as well as for purchase of coffee to be withdrawn from the open market when deemed necessary.

A small part was used to buy some of the capital stock of a local bank (Banco de Credito Agricolo e Hypothecario de Sao Paulo), which was renamed the Banco do Estado de Sao Paulo. Purchases of this stock by the institute and other departments of the State were sufficient to give them control of the bank, although it continues as a private corporation. New by-laws for the bank were drawn up and passed which effected an organization of a separate department to handle mortgage loans, on both urban and rural properties, and provided for the issuance by the bank of gold mortgage bonds. No more than 50 per cent of the appraised value of properties could be loaned on a first mortgage, and no higher appraisal than 2 milreis a tree, inclusive of lands and improvements, was allowed on coffee estates.

The bank arranged in November, 1927, with Lazard Bros., of London, for a sterling loan of £5,000,000, 20-year term, against the gold

(or sterling) mortgage certificates of the bank. This loan, in four series, is at the rate of 6 per cent per annum, while the bank, in accordance with its new by-laws, may lend at 9 per cent plus an administrative commission. On this basis the bank takes, of course, the risk of a weakening of the exchange rate.

Prior to this, on September 9, 1927, the President of the State of Sao Paulo announced the consummation of another transaction with Lazard Bros. This, also, was for £5,000,000 and should not be confused with the mortgage credit. It consisted of a credit, at the rate of 6½ per cent per annum, for the period of one year from the date of each draft, which was guaranteed by bills of lading or warehouse receipts (warrants) of coffee, at a maximum of 60 milreis (about $7.20) per bag, the respective drafts being indorsed by the Instituto de Café. Actually, this functions, and is functioning, as follows: When, for example, the bank has loaned the sum of the equivalent of £1,000,000 in milreis against official warehouse receipts of coffee, it draws on Lazard's credit for this amount, depositing the warehouse receipts as guaranty. As the coffee represented by these receipts arrives on the market and is sold, and the grower's account with the bank is liquidated, other receipts are put up as guaranty of the sterling credit, the whole operation being fiscalized by a representative of Lazard Bros. in the bank. Incidentally the bank makes these loans to the growers at the rate of 9 per cent, although, as with the mortgage credit, it takes the risk of a weakening in the exchange rate. On December 31, 1927, £3,500,000 of the credit had been used, and it was expected that the remainder would be drawn on in a short time.

It should be understood that while the Banco do Estado de Sao Paulo is one of the largest lenders of funds against warehouse warrants and farm mortgages, other Sao Paulo and Santos banks do this business. During the bumper 1927–28 crop these banks loaned large sums, especially against coffee bills of lading or warehouse receipts.

In the States of Minas Geraes, Rio de Janeiro, and Parana the tax of 1 gold milreis per bag is also collected, as in Sao Paulo, for defense purposes and to assist the growers financially, while in Espirito Santo the tax levied for these purposes was ½ gold milreis. It has been announced that this tax was increased to 1 milreis on February 15, 1929. However, in none of the States has the system been so well organized as in Sao Paulo.

About the middle of November, 1927, it was announced that the minister of finance of Minas Geraes had contracted with the Banco Commercial do Estado de Sao Paulo for this bank to furnish financial aid to the Minas Geraes coffee growers whose coffee was shipped out through Sao Paulo via the Mogyana Railroad. The government of Minas Geraes promised to furnish funds to be loaned at the rate of 9 per cent against coffee in the Minas Geraes regulatory warehouse in Campinas. At the same time the Banco de Credito Real do Estado de Minas Geraes, which has received the gold tax and handled coffee financing for the State since December, 1925, announced that its work was progressing satisfactorily. It must be remembered that Minas Geraes is not committed to the policy of purchasing actual coffee to maintain the market when deemed necessary, as is Sao Paulo; in fact, there is no provision in its law which will permit of

such purchases. Consequently, the State need not maintain a reserve fund for the purpose, being able to lend a larger proportional share of receipts from the gold tax directly to the farmers. Out of this tax must, of course, be met the costs of maintaining and enlarging the State's regulatory warehouses.

In the States of Rio de Janeiro and Espirito Santo laws have been passed which permit the respective coffee institutes of those two States to make loans on coffee deposited in the regulatory warehouses. Loans by the State of Rio de Janeiro are at the rate of 7 per cent per annum on a maximum amount of 50 milreis (about $6) per bag to the growers, while 10 per cent per annum is charged local commissarios. It has been impossible to obtain a statement of the total amount of these loans already effected, but it is believed that it is very small. However, local bankers have taken a considerable amount of this business at rather higher interest rates than those mentioned above. In Espirito Santo the proceeds of the gold tax are deposited in the Banco do Estado de Espirito Santo in a special account. So far as is known, no external loan using this tax as a guaranty has been floated. If it is simply allowed to accumulate, being drawn upon steadily by the cost of building and maintaining the regulatory warehouses, it will undoubtedly be a long time before sufficient funds are available to be of any material assistance to the growers. In the meantime, as in Rio de Janeiro, local banks are lending against warehouse receipts, but at high rates of interest.

MARKETING SAO PAULO COFFEE

As soon as the fazendeiro has picked, dried, cleaned, and sacked his coffee he hauls it to the nearest railroad station and prepares to ship. There are official railroad scales at the stations, and unless the farmer is extremely anxious to get his coffee off, he will have it weighed and obtain a receipt. If he ships without weighing, the railroad will not be responsible for loss in transit. No freight is paid in advance by the shipper and the shipment is never insured.

The coffee then goes to one of the Sao Paulo institute's official warehouses, whence, in the same order in which it has been received, it is forwarded to Santos. The institute, in accordance with its system of restricting receipts in Santos, allots to each warehouse the amount which it may send down daily. For each warehouse this is fairly calculated in ratio to the variable amount which is being allowed to enter Santos, as well as with the production of the district which the particular warehouse serves. Although under the control of the institute, these warehouses are operated by the various railroads which serve them.

RELATION BETWEEN FAZENDEIRO AND COMMISSARIO

The fazendeiro, after shipping his coffee, immediately forwards to his agent, the commissario in Santos, his bill of lading, weight receipts, and similar documents. He then waits for the commissario to notify him that his coffee has arrived. The relation between the commissario and the fazendeiro is often a complicated one. They may be close relatives with money invested in each other's business, and as a consequence participate in each other's profits. However,

as a usual thing, the coffee continues to belong to the fazendeiro until such time after arrival in Santos as he gives selling instructions to the commissario. Upon receiving such instructions, the commissario sells at the market as quickly as possible. From the cash received at the sale he deducts a 3 per cent commission and the expenses he has incurred, forwarding the balance to the fazendeiro.

This is the usual method, but very often, particularly if the commissario has difficulty in getting enough business from the farmer, he will send his agents to the interior to buy directly. In this case, in view of the fact that the commissario must pay the freight and carrying charges which would otherwise be for the account of the grower, he buys for much less than in Santos. Just what this difference in price shall be is very hard to determine. One might roughly estimate that coffee in the interior is worth 25 per cent less than in Santos. (Lately this difference has been as much as 100 per cent or more.) However, there have been rare occasions when even more was paid in the interior than in Santos. The whole relation depends so much upon how strongly the institute is putting its restriction system into effect, and upon what the fazendeiros think the market is going to do in the future, that it is impossible to determine an average difference in prices.

It may be mentioned that during the last few years it has taken from four months to a year or more for shipments to reach Santos, and that the interest rate on money loaned on shipped coffee has been from 1 to 2 per cent a month. It is also safe to say that the average freight rate per bag from the interior to Santos is 6 to 7 milreis, but a calculation of the more variable factors in this difference of price between Santos and in the growing country is impossible.

EXPENSES OF MARKETING

Upon the arrival of a shipment in Santos the railroad notifies the commissario to whom it is consigned. The commissario, after having the weight verified and after settling any claim against the railroad for loss, pays the freight of 6 or 7 milreis ($0.72 to $0.84) a bag, the State transportation tax of 1 gold milreis ($0.55) a bag, and the 200 reis ($0.024) tax a bag for propaganda. He then has the coffee carted to his warehouse, to await selling instructions from the fazendeiro. For this carting there is a charge of 8 reis per kilo (5.7 cents per bag). The actual cost of cartage is about 3 reis per kilo instead of 8, but this difference in some measure repays the commissario for the cost of storage and insurance of coffee in his warehouse; ordinarily, coffee is stored and insured free until it is sold. All these charges are paid by the commissario and deducted from the proceeds of the sale. The commissario usually charges 3 per cent commission for his services. In addition to these charges, the commissario deducts from the proceeds of the sale the advances which he has made to the grower and interest on those advances at 12 per cent per annum.

In some cases there is a charge for cleaning the coffee, but such charges are not always made and, when made, are not at all uniform. Many fazendas do not have proper machinery for cleaning. In such a case the cleaning is done at the point of shipment in the interior and the bill sent to the commissario.

In connection with the matter of loss of weight in shipment, it may be mentioned that there is seldom any difficulty in settling claims with the railroad. Few people outside of the commissario business appreciate the fact that the shipments sometimes weigh even more upon arrival in Santos than when they left the interior station. This is due, of course, to coffee's unique characteristic of absorbing moisture, and is said to be the source of a small profit to the commissario.

FUNCTIONS OF COMMISSARIO

Apart from his operations in connection with the grower, the commissario has, of course, further functions to perform. He must handle the coffee in his warehouses, put it in new sacks, and sell it to an exporter.

Upon arrival in the commissario's warehouse the various lots received from the growers are stacked separately. Duplicate samples are withdrawn and taken to the main office where they are carefully examined and classified. Once classified, the order is sent to the warehouse to place the lots in new sacks; triplicate samples are withdrawn; and the lots, now known as "lotes do commissario," are ready for sale to the exporters.

For the sake of simplicity the process as set forth above has been somewhat idealized. Usually it does not proceed quite so easily. The lots which come from the interior, though well cleaned, are often not large enough to go on the market as separate units. Very often, too, they have not been sufficiently separated into sizes and grades to bring the maximum price. For this reason the commissario, and even the exporter, has machinery in his warehouse for further grading, separating, and mixing. The benefits from this further machining do not accrue to the grower unless he has previously arranged for it. The commissario, upon receiving instructions from the fazendeiro to sell his crop, will often take over for his own account those lots which he thinks he can get a better price for after machining. He also takes advantage of his knowledge of the day-to-day market by mixing together several lots to make up one large one for which he knows there is a demand.

One must not get the impression that there is anything unfair about these operations on the part of the commissario. The grade of the lots forwarded by the growers and their market price may be verified by a central bureau of commissarios, which sees that justice is done to the man in the interior. Further, the commissario always keeps the original samples of the various lots he has received until the grower agrees that he has received a fair price.

As mentioned above, once the coffee has been separated into marketable lots it is put into new sacks. Deducting the weight of the sack, 60 full kilos are weighed out on scales whose accuracy is attested by municipal inspectors. Before the sack is sewed up a small handful of coffee is taken off the top. The resulting mixed sample, representative of the whole lot, is divided into three parts; one to be kept at the warehouse, another to remain at the office of the commissario, and the third to be shown to the exporters.

The process of sale to the exporter is simple. The commissario employs a broker who daily visits the exporters showing the samples

of the lots he has for sale. The broker is paid 200 reis per bag by both the commissario and the exporter for each sale he effects. The exporter examines the samples carefully, sometimes holding them long enough to test their flavor in the cup, and, if the quality and price are suitable, he purchases. These sales are made on a 30-day cash basis, with a discount at the rate of 6 per cent per annum if paid before the end of the 30 days. The cash must be received before the coffee can be withdrawn from the commissario's warehouse.

The price paid includes a separate charge of 3$500 (42 cents) per bag for the new bags the commissario has used. The exporter, in turn, passes this charge, together with others to be mentioned later, on to the importer in the foreign country. It may be mentioned that the new bag does not actually cost this much to the commissario, but he has several costs for handling and bagging the coffee that make up the difference.

FUNCTIONS OF EXPORTER

The exporter keeps in constant touch by cable with his representatives in the consuming countries. When he effects a sale he proceeds to embark the coffee which he already has on hand, or that which he then buys from the commissario.

Before being allowed to embark his shipment the exporter is required to "despatch" it, which is really the process of paying the various export taxes required. Armed with a description of the amount, price, name of purchaser and seller, etc., he proceeds to the office of the State tax collector. Here he is required to pay the following:

1. "Pauta," or export tax, which is 9 per cent ad valorem. The value of the coffee on which this tax is levied is determined by the State government semiannually in accordance with the average prices of the preceding semester. For example, to arrive at the amount of this tax on one bag of 60 kilos of coffee one takes 9 per cent of 60 times the pauta (official valuation). At the moment (March, 1928) the pauta is 2$800 per kilo. For one bag of 60 kilos we then have 9 per cent of 60 times 2$800, or a tax of 15$120 (about $1.81) per bag. The pauta is the same for all qualities and grades of coffee.

2. Surtax, which is the guaranty on an old State loan. This is at the rate of 5 francs per bag. At the present time (March, 1928) the franc is worth about 350 reis, which brings the surtax to about 1$750 (21 cents) per bag.

After the coffee has been "despatched," it may be shipped at any time. The exporter has previously arranged with the steamship agent for cargo space. Upon the boat's arrival in port, the coffee is carted from the exporter's warehouse to the docks. The cost for cartage and loading on board, which is charged to the foreign importer, is from 500 reis to 1 milreis (6 to 12 cents) per bag. The importer is also charged 150 reis (1.8 cents) per bag dock fees, and in the neighborhood of 1$200 (14.4 cents) for further expenses impracticable to separate. These include stamps, which must be placed on all documents of sale, cable costs, office overhead, and similar costs. The exporter often includes in his charges the commission which ultimately goes to his agents in the foreign countries. In the United States this charge is from 25 to 35 cents per bag.

We then find on the usual consular invoice of purchased merchandise the following charges and expenses, in addition to the purchase price:

Export duty, about 15$000 to 16$000 ($1.80 to $1.92) per bag.
Surtax (5 francs), about 1$750 ($0.21) per bag.
Sacks, storage, insurance, etc., 3$500 ($0.42) per bag.
Cartage, about 0$500 to 1$000 ($0.06 to $0.12) per bag.
Dock fees, 0$150 ($0.018) per bag.
Other charges, about 1$200 ($0.144) per bag.
Consular fee, about 24$000 ($2.88) per entire shipment.
Importer's brokerage (occasionally), about 25 to 35 cents per bag.

It is the almost invariable custom in the coffee business for the importer, upon agreeing by cable to a purchase, to open an irrevocable letter of credit in favor of the exporter. The exporter, after obtaining his bills of lading and consular invoices, goes to the bank and draws at sight on the letter of credit. In other words, the Brazilian exporter draws cash against his shipping documents, thus passing the ownership of the coffee over to the importer as soon as it is put aboard ship. The freight is paid by the importer.

OVERLAPPING OF FUNCTIONS

In the above paragraphs an attempt has been made to give as simple an explanation as possible of what happens to a bag of coffee from the time it is put on the railroad in the interior until it leaves Brazil. There is much left to be said, but it is believed that further details would confuse rather than clarify the understanding of this rather involved process. In many cases the commissario and exporter are the same, and they may do a commissario business for farmers and an export business for their foreign representatives and be interested in a few fazendas as well. The businesses often overlap, though each one justifies its existence. In at least one case there is a firm which buys green coffee in Santos and Rio as well as in the interior, ships it to the United States, roasts and packs the coffee for the local trade there, and finally sells it in its own retail stores. The exporter and the American commission agent and broker are cut out. This plan is practicable only in the case of a very large firm (some people believing not even then), and it works out in much the same way as the usual process, the difference being that the various branches of the business are combined under the same head.

TOTAL COSTS

The following statement shows the entire cost of a bag of Santos 4's in January, 1928:

Purchase price (official, 33$000 per 10 kilos)	198$000
Export duty (pauta, 2$800 per kilo)	15$120
Surtax (5 francs)	1$750
Other charges	5$600
Total	220$470

This total is approximately equivalent to $26.45 United States currency; if the importer's brokerage is added, the total is $26.75.

This is the present approximate cost of Santos 4's f. o. b. Santos, which is equal to about 20¼ cents per pound. The spot price in New York on the day this calculation was made was 21¾ cents.

The difference may be accounted for by the cost of maritime freight and insurance which have not been included, as well as by the fact that the official price is not necessarily the actual price which will have to be paid for soft Santos 4's.

GRADING COFFEE

There are outlined below a few essential facts of which the layman must be aware before he can fully comprehend a discussion of the coffee industry. The grade of coffee is determined by the number of imperfections in an average sample of a definite weight. The better grades are, of course, those with the least number of imperfections, and are classified as from grade No. 1 to grade 8 or 9. Grade No. 1 is an absolutely perfect coffee and is never found in commercial practice. The best grade purchasable is No. 2 while the average grade of coffees harvested in Sao Paulo for example, is usually No. 5.

IMPERFECTIONS

It is arbitrarily fixed that the main imperfection is the black bean which is commonly found in green coffees. A table of equivalents is used which places a rating on other imperfections in comparison with the black bean. Thus 5 broken beans, 2 " floaters," 3 shells, 1 husk, or 1 average-sized stone is equal to 1 defect or black bean.

The following is the classification of coffee in accordance with the Bolsa de Café (Coffee Exchange) in Santos.

	Defect (black bean)		Defect (black bean)
3 shells	1	1 large stick	2–3
5 green beans	1	1 ordinary stick	1
5 broken beans	1	2–3 small sticks	1
2 dry beans	1	1 large hull	1
5 badly formed beans	1	1 ordinary hull	1
1 large stone	2–3	2–3 small hulls	1
1 ordinary stone	1	1 cherry	1
2–3 small stones	1	2 floaters	1

OFFICIAL TABLE FOR CLASSIFICATION

Tin of 450 grams			Tin of 300 grams		
Defects	Type	Points	Defects	Type	Points
0	1	Plus 75	0	1	Plus 75
1	2 plus 20	Plus 70	1	2 plus 20	Plus 70
2	2 plus 15	Plus 65	1	2 plus 15	Plus 65
3	2 plus 10	Plus 60	2	2 plus 10	Plus 60
4	2 plus 5	Plus 55	3	2 plus 5	Plus 55
6	2	Plus 50	4	2	Plus 50
7	3 plus 20	Plus 45	5	3 plus 20	Plus 45
8	3 plus 15	Plus 40	5	3 plus 15	Plus 40
10	3 plus 10	Plus 35	6	3 plus 10	Plus 35
11	3 plus 5	Plus 30	7	3 plus 5	Plus 30
12	3	Plus 25	8	3	Plus 25
16	4 plus 20	Plus 20	10	4 plus 20	Plus 20
19	4 plus 15	Plus 15	12	4 plus 15	Plus 15
23	4 plus 10	Plus 10	15	4 plus 10	Plus 10
27	4 plus 5	Plus 5	18	4 plus 5	Plus 5
30	4	Base	20	4	Base
33	4 minus 5	Minus 5	22	4 minus 5	Minus 5
36	4 minus 10	Minus 10	24	4 minus 10	Minus 10
39	4 minus 15	Minus 15	26	4 minus 15	Minus 15

These continue in the same proportions up to grade 8 or 9.

CUP QUALITY OR FLAVOR

The grade of a coffee may have little or nothing to do with its " drink " or cup quality. Particularly in the Rio market, one may often find lots of very superior grade, say numbers 2's–3's, which drink " hard," or, in other words, have a rank flavor, which is very objectionable to the better American market. Imperfections do, of course, affect the flavor, but the main controlling factors in cup quality are the soil where the coffee is grown, the altitude, and the care with which the coffee is dried and prepared. There are three terms having to do with cup quality which must be fixed in the mind. These are " hard," " soft," and " mild." Hard and soft refer particularly to Brazilian coffees, while mild is a general term applied to coffees from Central America, northern South America, and elsewhere.

The hard flavor is a peculiarly rank one, characteristic of most coffees exported from the ports of Rio de Janeiro and Victoria. In these markets the lots are seldom tested in the cup, in view of this fact. The hard flavor is very penetrating, and a small amount of it will change the character of a large lot of soft coffee. It is owing to this flavor that Rio and Victoria coffees are cheaper than those from Sao Paulo and are not in large demand in the United States.

The soft flavor is mellow and somewhat sweetish, in contrast to the more acid coffees known as mild. This soft flavor is characteristic of Sao Paulo and much of the Sul de Minas coffees. During years of bad picking and drying weather in Sao Paulo, it is not unusual to find some of the coffee " hardish," although the term " Santos coffee," meaning that which is shipped from the port of Santos, has come to denote, generally, soft coffee.

It is difficult for the average person to catch the distinction between soft and mild, especially when informed that mild implies more acidity. The typical mild flavor is that which has none of the rankness of Rio coffees but is distinctly strong and acidic in the desirable sense. It goes farther in the cup and usually brings a better price than Santos or Rio coffees. The standard good types of roasted packaged coffee sold in the United States are generally composed of from about 15 to 40 per cent of mild Central and Northern South American coffees mixed with good-grade Santos stock.

SIZES AND TYPES OF BEANS

In the commercial description of a lot, there are usually several other characteristics mentioned. " Small bean," " medium bean," " good bean," " large bean," etc., refer to the average size of the beans, and depend principally on the size of screen through which the lot was passed. Other terms, such as " good roast," " fair roast," etc., describe the evenness and general appearance of the coffee after it is roasted and before it is ground. Sometimes the shade of color and hardness of the green beans are also indicated.

Further, there are three general types of beans which come from Sao Paulo. One is known as the Bourbon, which indicates a small " curly " bean that comes from a hybrid tree of Arabian derivation. Another is the flat bean, which is what its name indicates, and comes from the class of tree known as café commúm. The third is known

as the peaberry and is the subject of much misinformed discussion. This bean, instead of separating into two halves when taken out of the husk, remains as one rounded bean. It is nothing more or less than an immature or imperfect bean, usually coming from the ends of the branches of the tree which produces any other kind of coffee, and has the same flavor. It is usually separated from the flat beans on an inclined moving belt which carries the flat beans over the top and allows the peaberries to roll off, and is sold for a slightly better price because of its "fancier" appearance.

WEIGHTS AND MEASURES

All Brazilian coffee is sold for export in bags containing 60 kilos (132 pounds) net. In the Santos market it is quoted in terms of so many milreis per 10 kilos or one-sixth of a bag. In Rio de Janeiro it is commonly quoted at so much per 15 kilos or one-fourth of a bag, although a reform in weights is supposed to have been effected, putting the Rio quotation on the same basis as that of Santos. The farmers in the interior usually refer to their crop in terms of "arrobas," an old Portuguese weight unit. They always refer to their annual production as so many arrobas per 1,000 trees. The arroba is 15 kilos (33 pounds), the same weight on which Rio prices are based.

KEEPING QUALITY

Few of the uninitiated realize that coffee will "keep" in the green state indefinitely. In fact, it improves with age up to a certain point, becoming mellower and having a better appearance when roasted. This aging can be overdone, however. After about four years the coffee begins to lose its strength to an appreciable degree, although it never spoils if properly stored. Coffee after it is roasted loses its quality very rapidly. It should be used as soon as possible and should be kept in air-tight tins in the meantime, since it will absorb any strong flavors nearby and will become soggy with moisture. There is some advantage in grinding it fresh whenever used, though even the whole-roasted coffee deteriorates rapidly when exposed to the air.

SANTOS COFFEE EXCHANGE

The Bolsa Official de Café (Official Coffee Exchange) at Santos was created by a law of the State of Sao Paulo, No. 1416, of July 14, 1914 (regulated by decree No. 2516, of July 23, 1914), but was operative only on May 2, 1917. The cornerstone of its present building was laid on April 27, 1920, and the inauguration took place on September 7, 1922.

LAW OF OCTOBER, 1927

Decree No. 4229 of October 28, 1927, effective in November of that year, vested the bolsa with new regulations. The portions of the regulations of most interest to the coffee trade of the United States are given below:

The President of the State of Sao Paulo, using the authority conferred upon him by article 42, No. 2, of the constitution of the State, and in accordance with article 8 of law No. 2201 of October 10, 1927, orders that the following regulations be observed by the Santos Coffee Exchange:

ARTICLE 1. The official bolsa of Santos is subject to the direction of the syndic chamber of coffee brokers as indicated in this regulation. (1) The president of the syndic chamber will be the president of the bolsa, being nominated annually by the president of the State from among Santos coffee merchants.

ART. 2. The bolsa will also have a secretary, nominated by its president.

ART. 3. The coffee brokers will conduct all business for the sale or purchase of coffee for either spot or future delivery in the bolsa, and their number is not limited; each may employ three agents.

ART. 4. As part of its organization the bolsa will have the following:

(*a*) A commission of official experts to classify and evaluate coffee and to fix the differences of loss or profit in the operations effected in the bolsa.

(*b*) A consultive council composed of five coffee merchants elected annually by the Santos Commercial Association, which will be consulted by the syndic chamber on all subjects relative to the coffee business.

ART. 5. Only those firms registered at the Commercial "Junta" as members of the Santos Commercial Association and inscribed in the registry kept for this purpose at the offices of the bolsa may operate as dealers in coffee.

ART. 6. In operations realized in the bolsa, two members of the same firm may not act as buyer and seller at the same time.

ART. 7. No future operations may be effected outside of the bolsa or at hours other than those set for the meetings of the bolsa. Calls on the bolsa will be at 10.30 and 3.30 with only the 10.30 call on Saturdays. This time schedule may not be altered by the syndic chamber, nor may they open the bolsa for business on Sundays and legal holidays. At the calls, coffee prices will be fixed only for the near three months, and future purchases and sales effected.

[Under date of April 12, 1929, a decree was signed which modified the bolsa regulations, permitting future operations on the bolsa over six months instead of three months, as has been the practice. The decree was to be effective May 14, 1929.]

ART. 9. Business realized in the bolsa will be posted showing quantity, quality, type, and price; oscillation in price of more than 1$000 per call or a total of 2$000 per day not being permitted.

ART. 10. The syndic chamber will inform the secretary of finance and treasury each day of each quotation made and will publish these quotations in newspapers of large circulation in Santos and Sao Paulo.

ART. 11. Controversies arising from operations on the bolsa must be settled by arbitration. To form the arbitration committee, the disputing parties will choose their arbiters from a list of 20 firms indicated by the Santos Commercial Association each year for this purpose.

SYNDIC CHAMBER OF BROKERS AND CONSULTIVE COUNCIL

ARTS. 12 and 13. The syndic chamber will be composed of five members, four being elected annually by the brokers on the bolsa from among themselves and one being appointed by the president of the State from among the coffee merchants, who shall act as president of the bolsa and of the syndic chamber. The elections among the official brokers will be held during the last 15 days of June. The syndic chamber will elect a vice president from its members. In case of vacancy, the member's place will be taken by the one who had the next greatest number of votes at the previous election, and in case of tie priority of matriculation will decide the question.

ART. 14. Acceptance of election to the syndic chamber is obligatory except in case of sickness or other justifiable reason, although reelection need not be accepted.

ART. 17. Of special note among the duties of the syndic chamber is the requirement that they verify the size of the stock of coffee in Santos and organize general statistics.

ART. 18. The consultive council will be constituted of five coffee merchants of Santos selected annually by the Santos Commercial Association in the second half of June. Its power, or that of any of its members, may be renewed.

ART. 19. The consultive council will choose a president and secretary from its own members.

ART. 20. The consultive council will meet when called by its president, at the request of the syndic chamber, or when it needs to pass opinion on any business sent it by the syndic.

[The regulations as to the attributes and requirements of the president of the bolsa, syndic members, secretary, and brokers, are omitted. They are in great detail and not of sufficient interest to be included in this report.]

COMMISSION OF EXPERTS AND CLASSIFICATION OF COFFEE

ART. 67. The commission of official experts referred to in article 4 will be made up of four functionaires of the bolsa nominated by the secretary of finance and treasury of the State of Sao Paulo, following a meeting realized before a commission of competent individuals nominated and presided over by the president of the bolsa.

ART. 68. Members of this commission will not be allowed to engage in the coffee business in any other capacity.

ART. 69. The commission of experts has the following duties: (1) Organize official coffee types and furnish samples of the types to the bolsa to facilitate operations.

(2) Classify all coffee to be delivered on the bolsa.

(3) Classify and evaluate coffee for the purpose of fixation of differences, losses, and gains in operations realized on the bolsa, and, in general, in all cases where their classification is solicited by interested parties. The work shall be assigned to each expert impartially, and his name is not divulged to interested parties.

ART. 72. Two experts will classify each sample.

ART. 74. Coffees which are "hard," humid, deteriorated, or rain-damaged may not be delivered in the bolsa.

ART. 75. If the experts reject up to one-third of a lot of 1,000 bags, the petitioner has the right to substitute other samples for those rejected within 24 hours without increase in the charges for classification.

ART. 76. Classification will consist in determining the number of points, to the value of 20 reis each above or below each official type of the bolsa, fixed according to the common practice of the Santos Commercial Association. The difference between types is 25 points between types 3 and 4, and 50 points between types 4 and 5, the classifications being made in round numbers of 5 points each.

ART. 77. The classification of quality will consist of a minute description of the coffee, indicating color, style, roast, grade, bean, and declaration if the coffee is soft, hard, badly dried, or deteriorated.

ART. 78. All classifications must be made within 48 hours, except in case of "force majeure" certified to by the commission of experts, in which case a further period of 48 hours will be permitted.

ART. 79. Only the secretary will know the name of the person requesting official grading, and he will be responsible for keeping the name secret.

ART. 81. In the composition of lots submitted for classification, only types 2 to 5 will be admitted, with the exception that up to 100 bags of types 5 to 10 may be allowed in a lot provided that the average of the lot is not below 5.

ART. 83. If the samples do not conform to the lot delivered, the secretary, in the presence of interested parties, will have new samples drawn which he shall submit to the examination of the experts. The interested parties may appeal from the verdict of the experts to the arbitration judge.

ARBITRATION

ART. 88. Recourse to arbitration is allowed in the classification of any lot or part of a lot. Request for arbitration must be made of the bolsa within 48 hours from the notification or receipt of the lot, the name of the arbiter selected from the annual list of 20 prepared for this purpose by the Santos Commercial Association being indicated at the same time.

ART. 90. Having received the petition for arbitration, the bolsa will notify the defending party within 24 hours, who must name his arbiter within 24 hours. The arbiters must give their decision within 48 hours, and the decision must be communicated to the interested parties within another 24 hours. The arbiters may have new samples drawn. In case of disagreement between the arbiters, they will choose a third one between themselves as an umpire. If the two can not agree on a third, each will name his choice of umpire and the drawing of lots will decide which is to serve.

ART. 91. The decision of the arbiters is final.

ART. 92. Each arbiter will receive a fee of 150$000, which will be paid by the loser in the decision.

SPOT COFFEES

ART. 94. The basis for spot coffees is understood as the price at which soft 4's (without other description) may be negotiated.

(1) The base for these coffees will be given, on all working days when the bolsa functions, by a representative of the Sao Paulo Coffee Institute designated by the secretary of finance and treasury, after the representative has received written reports on the prices and state of the market from a commission composed of four men chosen every four months by the secretary of finance and treasury from among merchants and brokers.

(2) The information referred to above must be given to the representative of the Coffee Institute before 3.30 in order that it may be the basic price furnished to the bolsa in time to be included in the bulletin of quotations of the future and spot markets.

(3) The state of the market should be designated in the following terms only: Nominal, calm, stable, firm, very firm, paralyzed.

QUANTITY SOLD

The quantity of coffee sold on a future basis and registered on the Santos Coffee Exchange has been as follows:

	Bags
1917, May to December	2,529,000
1918, January to June	3,204,000
Total	5,733,000
1918, July to December	14,213,000
1919, January to June	14,385,000
Total	28,598,000
1919, July to December	21,321,000
1920, January to June	7,410,000
Total	28,731,000
1920, July to December	5,854,000
1921, January to June	5,832,000
Total	11,686,000
1921, July to December	6,778,000
1922, January to June	6,631,000
Total	13,409,000

The quantity has decreased considerably in recent years, as shown by the following figures:

	Bags
1925, July to December	4,472,000
1926, January to June	1,506,000
Total	5,978,000
1926, July to December	1,206,000
1927, January to June	130,000
Total	1,336,000
1927, July to December	61,000
1928, January to June	179,000
Total	240,000

The total sales on the bolsa from July 1, 1928, to June 30, 1929, were 509,000 bags.

RIO DE JANEIRO COFFEE MARKET

Until about 15 years ago there were three distinct classes engaged in the coffee business in the port of Rio de Janeiro. They were the commissario, the "ensaccador" (sacker), and the exporter. The commissario received the shipments from the interior and advanced money to the growers, generally acting in the capacity of city agent and banker for the fazendeiro, as he does to-day. Unlike the present practice, however, he sold the crop for cash to the sacker, whose business it was to machine, grade, clean, and classify it for the foreign markets. The sacker then sold to the exporter, who simply maintained offices and acted more or less in the capacity of a foreign purchasing agent for the importers in Europe and the United States.

To-day the sacker, as such, is no longer existent, his place being taken by the exporter, who himself maintains warehouses and machinery for sacking, cleaning, grading, and generally preparing the coffee for the foreign markets. In fact, even the commissario now maintains machinery for this purpose. There are about 50 exporters in Rio de Janeiro (January, 1928), who daily proceed to the "Centro do Commercio de Café," where the commissarios display samples of the lots they have for sale. All coffee business in Rio de Janeiro is now done on a cash basis on the same day the transactions are effected. The exporter, at the time of paying, receives a delivery order which he presents at the commissario's warehouse together with a sufficient number of sacks to hold the purchase. The coffee is then changed from the commissario's bags to those of the exporter, and transported to the exporter's warehouse. Here it is classified, separated, and placed in the new export bags. The exporter receives cash against shipping documents for his sales to foreign countries.

A coffee exchange exists in Rio de Janeiro, where futures may be bought or sold. As it is not remarkably different from any other commodity exchange in its organization and operation, it will not be discussed in detail in this survey. There follows an explanation of the organization of the Centro do Commercio de Café.

CENTRO DO COMMERCIO DE CAFÉ OF RIO DE JANEIRO

The "centro" is not a coffee exchange; it is an actual market where coffee is bought and sold. It occupies the third floor of the building at 191 Rua da Quitanda, the second floor of which it rents to the bolsa (exchange), where the regular future (term) market is carried on. It was founded in 1901.

Unlike the exchange, the centro is entirely free from Government regulation or interference. It is a civil society with a judicial personality distinct from that of its members. Members who own stock in the organization must be of one of the following occupations: Exporters, commissarios, sackers of coffee, warehousemen, members of caixas de liquidação (clearing houses), coffee brokers, roasters, and intermediaries.

The object of this market is that of any other commodity market. It furnishes a place for buyers and sellers to meet with the least trouble, and acts as a clearing house of information, giving stability and uniformity to the daily transactions. Its members are required to record all of their sales and purchases, giving amounts, names of buyers and sellers, and price basis for grade 7. The particular grade dealt in need not be mentioned, which leaves some doubt as to the price actually paid, though this is unimportant in view of the fact that all Rio coffee is dealt in on the price basis of grade 7.

The other important aims of the Centro do Commercio de Café are to investigate questions relative to the growth, preparation, and general commerce of coffee, to promote propaganda intended to increase the consumption of coffee, and to maintain a statistical bureau which estimates future crops and furnishes statistics on the importation, exportation, stocks, and consumption, both in Brazil and in foreign countries.

To achieve these various ends the "centro" does the following things:

1. Maintains booths and tables in the building where the sellers can display their samples.
2. Gives daily information to its members as to entries, exportations, stocks, sales, and price quotations in both Rio and Santos.
3. Publishes both daily and monthly bulletins giving latest statistics and news.
4. Maintains a standard set of samples of all types and qualities.
5. Maintains a board of arbitration to settle controversies between members.

There are two important classes of members. The first class is the stockholders, whose number is limited to 100, and who are now required to contribute 5 contos ($600) upon admittance. This is aside from the cost of their share of stock. The second class is that of the subscribing members. Their number is unlimited, and they may be either individuals or firms of any sort. They have the same privileges for the conduct of business as do the stockholding members, but are not allowed as complete power in the internal affairs of the organization. As to dues the only requirement is that they pay 200 milreis ($24) a year.

The administration of the society is in the hands of the administrative council and the directorate. The council is composed of seven members elected from the stockholders by the general assembly, in which the subscribing members are allowed to vote. The directorate, whose members are also included in the administrative council, is composed of a president, a secretary, and a treasurer, who must be stockholding members. They are elected by the administrative council.

There are three permanent committees, as follows: (1) Arbitration committee, (2) committee for crop estimates, and (3) price-quotations committee.

The members of all these may be either stockholders or subscribers. The committee of arbitration, which is of three persons, is authorized to make official gradings of coffee. There are three members, also, of the committee of crop estimates.

The quotations committee is made up of as many members as the general assembly sees fit to appoint. These members fall into two classes—the exporters and the commissarios. At the present time there are about 50 of them taken together. Daily, at 10 o'clock, this committee meets and by lot appoints a subcommittee of two commissarios and one exporter. These three men meet before 10.45, and, by means of the records of the business done from the close of the day before up to that time, determine what the price basis of grade 7 is for the day. This, with a brief remark as to the state of the market, is immediately posted. Members are not, of course, required to buy or sell on this basis, but it gives them all an equal idea of what the market is and consequently has a stabilizing effect Another subcommittee of the same sort works out and posts the differences in prices of the grades above and below grade 7.

The centro has other functions, among which are two or three philanthropies for the benefit of its members and of coffee laborers, but these are unimportant from a business point of view.

STATISTICS OF PRODUCTION

BRAZIL AS A WHOLE

ACREAGE UNDER CULTIVATION

The culture of coffee in Brazil at the present time is confined principally to 14 States, according to information received from the Ministry of Agriculture of Brazil, although coffee is grown to some extent in several other States. The following table shows the number of acres planted to coffee, as reported for the crop year 1925–26:

	Acres		Acres
Sao Paulo	3,087,500	Parahyba	20,155
Minas Geraes	825,523	Goyaz	15,862
Rio de Janeiro	494,000	Santa Catharina	12,350
Espirito Santo	316,160	Alagoas	2,964
Bahia	172,900	Sergipe	1,976
Pernambuco	111,150	Matto Grosso	247
Parana	61,750		
Ceara	61,750	Total	5,184,287

With the expansion in area in the districts known as the Araraquara, Noroeste, and the Sorocabana, and in Parana and other zones, unquestionably the area is actually considerably higher for current crops, and these figures should be considered as a conservative estimate.

NUMBER OF TREES

The number of coffee trees in Brazil probably ranges between 2,250,000,000 and 2,500,000,000. There is a great variation in the actual figures for the trees in the several States, depending upon the source of the statistics, and, at best, such figures should be considered as only approximately correct.

The following figures were extracted from the remarks of Dr. Mario Rolim Telles, president of the Sao Paulo Coffee Institute, on the inauguration of the convention of coffee States in September, 1928. With the exception of Sao Paulo, Minas Geraes, and Parana, the figures appear to be for the crop year 1925–26:

COFFEE TREES IN BRAZIL

State	Trees in full bearing	Trees not bearing	Total
Sao Paulo	1,047,233,000	133,750,000	1,180,983,000
Minas Geraes	541,123,000	47,161,500	588,284,500
Rio de Janeiro	112,476,750	33,743,025	146,219,775
Espirito Santo	94,930,000	34,520,000	129,450,000
Bahia	53,891,700	17,206,000	71,097,700
Pernambuco	55,000,000		55,000,000
Parana	14,500,000	13,000,000	27,500,000
Goyaz	7,000,000	5,000,000	12,000,000
Ceara	24,352,000		24,352,000
Parahyba	14,400,000		14,400,000
Santa Catharina	3,440,000	80,000	3,520,000
Alagoas	2,015,580	417,520	2,433,100
Sergipe	1,319,175	33,825	1,353,000
Matto Grosso	223,400	204,200	427,600
Total	1,971,904,605	285,116,070	2,257,020,675

COFFEE PRODUCTION

According to data supplied by the Sao Paulo Coffee Institute, the world's coffee production was 36,337,000 bags (of 60 kilos) for the year 1927–28, of which Brazil's share amounted to 28,334,000 bags, 77.97 per cent; the world's production in 1926–27 amounted to 25,342,000 bags, of which 18,274,000 bags were Brazilian.

NUMBER AND SIZE OF FAZENDAS

There is considerable variation from State to State in the average size of the coffee fazendas. As could be expected, Sao Paulo leads the list in both size and number of trees. This State has been the scene of intense development by a comparatively few large landowners. Minas Geraes, on the other hand, has been exploited by a less wealthy and more independent class, as witnessed by the fact that although there were more coffee fazendas in 1920 in that State than in Sao Paulo, their average size was less than half of that of Sao Paulo. The State of Rio de Janeiro, like Sao Paulo, has been developed by the larger type of landowner, while Espirito Santo compares more nearly with Minas Geraes. Information supplied by the director of industry and commerce of the State of Sao Paulo for 1926 shows that there were 40,181 fazendas in the State of Sao Paulo, while the federal census for 1920 records 41,393 fazendas in the State of Minas Geraes. The average size in trees was 28,000 trees for Sao Paulo and 12,000 for Minas Geraes. In Sao Paulo there are many fazendas with hundreds of thousands of trees, and there are more than 20 with over 1,000,000 trees each.

NEW AREAS

The areas newly planted in coffee are largely dependent on transportation. One may say, roughly, that climatic and soil conditions are either suitable or not suitable for coffee; the point being that there has not been a sufficient increase in efficiency of cultivation to cause many lands, which were previously considered too poor, to be planted in the older districts. Consequently, in the State of Sao Paulo, new areas are found in the more remote parts of the State.

The expansion has been to the westward along the railroads. From north to south the principal new districts are known as the Araraquara, the Noroeste, and the Sorocabana. The Noroeste, or that part of Sao Paulo lying along the Noroeste Railway from Bauru to Aracatuba, has been particularly noted as "El Dorado" for the new planters. Land prices have increased enormously, and planting has been very extensive.

The following table shows 16 municipalities in Sao Paulo with the greatest number of new trees:

NEW COFFEE TREES IN SAO PAULO

Municipality	General district	New trees
Pirajuhy	Noroeste	20,000,000
Catanduva	Beyond Araraquara	7,600,000
Piratininga	Noroeste	6,660,000
Oleo	Sorocabana	6,000,000
Albuquerque Lins	Noroeste	5,693,000
Bebedouro	Northwest of Ribeirao Preto	5,000,000
Itapolis	Araraquara	5,000,000
Barretos	Northwest of Ribeirao Preto	4,000,000
Jaboticabal	Araraquara	4,000,000
Olympia	Northwest of Ribeirao Preto	4,000,000
Novo Horizonte	Noroeste and Araraquara	3,500,000
Botucatu	Noroeste	3,200,000
Limeira	Between Rio Claro and Campinas	3,000,000
Rio Pardo	Sorocabana	3,000,000
Sao Manoel	Noroeste	3,000,000

Source: Directoria de Industria e Commercio of Sao Paulo, 1926.

The State of Parana, to the south of Sao Paulo, has been, simultaneously with the expansion to the west in Sao Paulo, the scene of a coffee-planting boom. New highways and railroads in the district between Ourinhos, on the southern border of Sao Paulo, and Jaguariahiva, almost due south in Parana, together with the desire on the part of many planters to remove themselves from the State of Sao Paulo in order that they might not be restricted in their marketing operations by the defense restrictions, have been the cause of much new planting. About half of the trees have not come into production yet, and the other half are young.

It has proved very difficult to obtain statistics as to new planting in the State of Minas Geraes. The best information indicates that it has been small in the State as a whole. As new planting has been considerable in the State of Espirito Santo, it is reasonable to suppose that the eastern part of Minas Geraes, which is adjacent to Espirito Santo, has witnessed the same development.

The best data show that in the State of Espirito Santo between one-fourth and one-third of the total number of trees planted are new ones which have not yet begun to produce. As in Sao Paulo, development has been dependent on transportation. According to official figures for the State, those municipalities in Espirito Santo which have the most new trees planted are as follows:

	New trees		New trees
Alegre	10,872,438	Serra	4,698,015
Sao Pedro de Itabapoana	9,971,375	Santa Thereza	3,462,373
Collatina	6,905,400	Affonso Claudio	3,430,799
Cachoeira do Itapemirim	6,667,734	Pao Gigante	3,175,797

Among the principal producing States Rio de Janeiro has the poorest prospects for increased production. Many of her fazendas are very old, and new planting is small, as witnessed by the fact that only 10 of her 48 municipalities had over 800,000 new trees planted in 1927:

	New trees		New trees
Itaperuna	4,140,700	Parahyba do Sul	1,901,680
Sao Fidelis	2,423,600	Cantagallo	1,483,500
Sao Francisco de Paula	2,364,000	Cambucy	1,212,800
Campos	2,165,300	Barra Mansa	983,300
Bom Jardim	2,108,800	Macahe	925,000

These districts are nearly all in the north central and northern part of the State.

With regard to all Brazil it is interesting to note that during the last three or four years much greater attention has been paid to fertilization, replanting, and general maintenance of the older fazendas.

INDUSTRY BY STATES

SAO PAULO

Various phases of the industry in Sao Paulo have been dealt with in preceding pages. The purpose of this section is to show a collection of figures that will give an idea of the size of the industry in each State.

There are over 1,000,000,000 coffee trees in Sao Paulo. It would be actually more correct to say that there are over 1,000,000,000 "hills" (pés) of trees, since more than one tree is planted to a hill. As explained in the preceding pages, however, these hills are counted as one tree for statistical purposes. Of the total over 100,000,000 are said to be young trees not yet bearing.

The following tabulation from official sources indicates the number of trees in 1928 by railway zones:

COFFEE TREES IN SAO PAULO

[In thousands]

Railway	New trees	Producing trees	Total
Paulista	19,600	263,502	283,102
Mogyana	8,500	250,275	258,775
Sorocabana	32,200	150,780	182,980
Itatibense	1,000	8,000	9,000
Sao Paulo (Bragantina branch)	450	30,006	30,456
Central (Sao Paulo branch)	2,100	36,000	38,100
Araraquarense	16,100	125,800	141,900
Douradense	6,600	67,320	73,920
Sao Paulo-Goyaz	16,000	26,930	42,930
Noroeste	31,200	88,620	119,820
Total	133,750	1,047,233	1,180,983

The production in Sao Paulo over a series of years is indicated in the following table, compiled from official sources:

AVERAGE PRODUCTION OF COFFEE IN SAO PAULO

Year	Number of producing trees	Production, in bags of 60 kilos	Average production per 1,000 trees	
			In arrobas	In pounds
1909–10	696,701,425	12,125,051	63.3	2,068.9
1910–11	696,701,425	8,458,376	48.5	1,600.5
1911–12	696,701,425	10,580,172	60.4	1,993.2
1912–13	720,979,284	9,470,833	52.5	1,732.5
1913–14	722,420,748	11,072,387	61.3	2,022.9
1914–15	735,444,350	9,206,507	50.0	1,650.0
1915–16	755,426,130	11,711,200	64.4	2,125.2
1916–17	791,256,485	9,937,895	50.2	1,656.6
1917–18	834,188,765	12,210,150	58.8	1,940.4
1918–19	828,355,425	7,253,250	35.0	1,155.0
1919–20	826,644,755	4,154,700	20.1	663.3
1920–21	843,592,695	10,246,200	48.5	1,600.5
1921–22	871,897,400	8,197,700	37.6	1,240.8
1922–23	899,239,100	7,046,900	31.3	1,032.9
1923–24	949,149,451	10,374,355	43.7	1,442.1
1924–25	951,288,450	9,192,600	38.6	1,273.8
1925–26	966,112,590	10,087,175	41.7	1,376.1
1926–27	[1] 1,000,000,000	10,627,629	42.5	1,399.2
Average			47.0	1,551.5

[1] Estimated.

More recent statistics place the production in 1926–27 at 9,876,545 bags and in 1927–28 at 19,381,010 bags, the last-mentioned crop being a record yield. The yield per 1,000 trees over the past 19 years has averaged practically the same figure indicated.

MINAS GERAES

The end of the nineteenth century witnessed a great activity in the planting of coffee in the State of Minas Geraes; the introduction of the coffee plant, however, had taken place many years earlier.

The varieties cultivated are Creolo, or common, Maragogipe, Bourbon, amarello (Botucatu), and others. The area under cultivation is about 1,000,000 acres, and the latest reports place the number of trees at close to 600,000,000, although not all are in full bearing. This State ranks next to Sao Paulo as a coffee producer.

The crop produced for export markets ranges from about 3,000,000 to 5,000,000 bags of 60 kilos. According to data supplied by the department of agriculture for the State, the production in 1927–28 was 5,875,300 bags, compared with 4,403,184 bags in 1926–27. The internal consumption was estimated at 1,375,300 bags in 1927–28, which leaves an exportable surplus of 4,500,000 bags in that year.

The following figures showing the exportable crop of coffee produced in Minas Geraes were taken from "Coffee" (Sao Paulo Coffee Institute edition), published in 1928 by the Museum of Agriculture, Commerce and Industry:

	Bags		Bags
1921–22	3,497,438	1924–25	3,010,820
1922–23	3,939,647	1925–26	2,710,861
1923–24	3,189,972	1926–27	3,016,666

The State of Minas Geraes has no seacoast; consequently the coffee finds its way to foreign countries through the ports of Santos, Rio de Janeiro, and Victoria.

RIO DE JANEIRO

The cultivation of coffee in the State of Rio de Janeiro began in the latter half of the eighteenth century. For many years Rio de Janeiro led in the quantity of coffee produced, but at the present time it is outdistanced by Sao Paulo, Minas Geraes, and probably Espirito Santo. The port of Rio de Janeiro, however, is still one of the leading coffee ports of Brazil, being second to Santos. Coffee from the neighboring States of Minas Geraes, Espirito Santo, and Sao Paulo comes to this port.

The principal municipalities producing coffee are Itaperuna, Santo Antonio de Padua, Cambucy, Sao Francisco de Paula, Bom Jardim, Campos, and Sao Fidelis. According to the best available data the area under cultivation is about 500,000 acres, and the annual yield is approximately 1,000,000 bags. The following figures indicating the production were obtained from "Coffee" (Sao Paulo Coffee Institute edition), published in 1928 by the Museum of Agriculture, Commerce, and Industry:

	Bags		Bags
1921–22	1,020,647	1924–25	703,515
1922–23	1,410,467	1925–26	766,666
1923–24	597,516		

ESPIRITO SANTO

Since the first decade of the nineteenth century, coffee has been among the products exported from the State of Espirito Santo. There are between 300,000 and 400,000 acres under coffee cultivation. At the present time there is said to be an exportable crop of between 1,000,000 and 1,500,000 bags. The directorate of agriculture of Espirito Santo reported 19,155 properties in 1926, 31 coffee-producing municipalities being covered by the census. The number of trees was given for the same year as 161,462,790 trees in production and 76,472,109 new trees, a total of 237,934,899 trees. The Sao Paulo Coffee Institute for the crop year 1925–26 reported 94,930,000 trees in bearing and 34,520,000 trees not bearing, a total of 129,450,000 trees. The bulletin of Nortz & Co., April 5, 1929, says that the number of coffee trees in Espirito Santo is reported to be 162,000,000 in full production, 76,000,000 new trees which will bear for the first time in 1929, and 13,000,000 new trees not yet bearing, 251,000,000 trees in all.

The centers of heaviest production are the municipalities of Alegre, Sao Pedro de Itabapoana, Cachoeira do Itapemirim, Collatina, and Santa Thereza. There are very few large plantations in Espirito Santo.

Figures in the edition of "Coffee," previously mentioned, show the following estimated production for Espirito Santo:

	Bags		Bags
1921–22	471,566	1924–25	750,000
1922–23	554,787	1925–26	1,083,333
1923–24	577,433	1926–27	1,166,666

Victoria is the chief port of exportation for the State, although a part of the production in the southern part moves through Rio de Janeiro. It is also true that some coffee from Minas Geraes in the regions served by the Victoria to Minas Railway is exported through Victoria. For these reasons the figures for the port of Victoria are not representative of the production in the State of Espirito Santo.

PARANA[1]

Among the smaller coffee-producing States of Brazil, Parana seems to have the greatest opportunity for future development. In the northeastern part of the State, adjacent to Sao Paulo, the climatic conditions are good and the soil very fertile. At the present time coffee culture is limited to the district between the Itarare and Laranginha Rivers, tributaries to the Cinzas River, in the municipalities of Thomazina, Colonia Mineira, Sao Jose da Boa Vista, Carlopolis, Santo Antonio da Platina, Jacarezinho, and Ribeirao Claro, for this is the only region served by easy means of transport to the ports of Santos, Paranagua, and Antonina. The construction of railway lines connecting the producing areas will undoubtedly encourage rapid development of the district.

The production of coffee in the zone in question, which was almost nil 10 years ago, has increased rapidly. In the crop year 1927–28, Parana exported 443,343 bags of coffee, of which 438,193 bags went out by Paranagua and 5,150 bags by Santos. However, 70,429 and 310 bags, respectively, originated in the States of Sao Paulo and Santa Catharina. The 367,454 bags of Parana coffee shipped through Parangua show a remarkable gain over previous years. The extension of transportation facilities is primarily responsible for this increase.

The following figures were compiled from the annual messages of the president of Parana and show the number of bags of coffee shipped from Santos and Paranagua:

SHIPMENTS OF COFFEE FROM PARANA

[In bags of 60 kilos]

Crop year	From Santos	From Paranagua	Total
1924–25	17,047	48,624	65,671
1925–26	36,517	121,329	157,846
1926–27	6,722	75,050	81,772

The trend in the movement to Parana's port of Paranagua is plainly evident from the above figures.

It is interesting to note that the region in which coffee has been planted is limited by the Itarare and Laranginha Rivers and has a superficial area of about 7,500 square kilometers. This is the zone which has transportation facilities. Here, alone, if the area were entirely planted to coffee, it is said that 300,000,000 trees could be accommodated. These trees usually produce 2 kilos each a year (133 arrobas per 1,000 trees), and frequently very much more, after their third year of growth. Thus, in this district alone, it is

[1] Based chiefly on an article by Dr. Ferreira Correia, director of the State Serviço do Povoamento do Solo.

probably possible to grow 6,000,000 or 8,000,000 bags a year. It is said that no part of the State of Sao Paulo, outside of the Paranapanema Valley, is equal in capacity of production to that of the coffee zone of Parana.

One hundred and fifty-two kilometers (94 miles) of the railroad from Jaguariahyva north are already in traffic. Nearly all of the crop from this region finds its way to the port of Paranagua, not only because it is closer than Santos, but also because of the congestion and defense restrictions to which shipments are subject at Santos.

The port of Paranagua, although insufficiently equipped for the embarkation of merchandise, is believed to allow for quicker shipment than Santos.

BAHIA

According to the inspector of agronomy of the department of agriculture of the State of Bahia, that State does not have any certain method of calculating the area in production of coffee nor that which is newly planted.

The zone covered by coffee planting extends at an average depth from the coast of about 90 miles from a line with the capital of the State, Bahia (Sao Salvador), to the Minas Geraes frontier. Geologically, this land is of granitic formation, and the coffee grows best in the strip of land called matta acatingada (zone of scrub brush), which is a transitional district between the lower coastwise zones of cacao forest and the higher and drier country.

Coffee is also cultivated in the forest districts farther back in the interior, in a general line from the small village of Villa Nova to the Minas Geraes border. This forest grows on the eastern slope of the mountain range between the coast and the Sao Francisco River Basin and in other high districts in the hinterland where the winter rains, owing to the altitude and the direction of the wind, arrive. With the further propagation of Robusta coffee, which is better adapted to the climate of low-lying and more humid districts along the coast, it is believed that the production of coffee in the State will increase.

The acreage has increased considerably because of high prices, and a constant development in the exports has been noted in the past few years. There are now about 71,000,000 trees in cultivation, and the State ranks fifth in the Brazilian coffee industry.

The message of the president of the State for 1928 reveals the following amounts of coffee exported:

	Bags		Bags
1922	201,830	1926	341,167
1923	218,543	1927	377,518
1924	259,081	1928	414,714
1925	246,746		

It is true that Bahia's exports have increased, but at the same time it should be noted that some coffee from Minas Geraes, which came via Caravellas, began to pass through the port of Bahia in 1928.

COST OF PRODUCTION IN SAO PAULO

COMPILATION BY TRADE COMMISSIONER McCREERY

I. INVESTMENT

The value of a coffee fazenda is indicated in terms of milreis per tree. This sum includes every value of the fazenda, such as reserve lands, improvements, machinery, and timber. At the time this survey was written (January, 1928), the approximate average investment, or value per tree, was 5$000 (60 cents). This statement of value is verified by at least eight authorities on coffee. In terms of 1,000 trees, the usual unit of calculation, and employing the interest rate usual on farm mortgages, 15 per cent[1] per annum, it is found that the average interest on investment per 1,000 trees per year equals 750$000 ($90).

II. WORKING CAPITAL

The investment in stock, both work and useful, is small on most fazendas and is included in the 5$000 per tree quoted. Cultivation is usually effected on a contract basis by the colonos, who, for the most part, do the work by hand. Interest on the investment in mules and oxen used in the transport of the coffee from the trees to the drying grounds, and from the farm to the railroad, is included under the general heading of transport costs.

Interest on the investment in machinery is included under the costs of conditioning for shipment. This item may also be considered as making up part of the item of investment, as the small amount of machinery used on a fazenda is included in the value per tree.

The interest on investment in seed and fertilizer is a highly variable and unimportant item which is almost impossible to determine. For the purpose of this report it will be disregarded.

The determination of the cost of interest on working capital is extremely difficult. As it is customary for the commissario to advance to the grower approximately 60 per cent of his estimate of the value of the forthcoming crop, and as this amount constitutes the principal working capital of the fazendeiro, it is considered fair to use this figure as an arbitrary basis for our calculations.

Twelve per cent is the universal rate at which commissarios advance working capital to their clients in the interior. They sometimes borrow at even a higher rate and take a small loss in lending to the farmers. The Banco do Estado de Sao Paulo lends money at 9 per cent, but only against warehoused coffee. The growers can convert loans from commissarios to loans from the bank after their crop is shipped, thus saving interest until such time as their crop is sold.

[1] Farm mortgages are often taken at a lower rate than 15 per cent, notably by the commissarios, at the standard rate of 12 per cent, which includes, however, a guaranty that the commissario will handle the sale of the crops produced. However, 15 per cent is fixed arbitrarily as a fair annual interest to the grower on his investment.

An average estimated value of any forthcoming crop while it is in the interior must also be arbitrarily fixed. The amount of 100$000 ($12) per bag, considered as the average price paid by the interior buyer, is liberal. Therefore the total amount of working capital advanced during the cycle from the time when the crop begins to grow until it is sold in Santos is 60 per cent of 100$000 times 11¾ bags (47 arrobas, average production), or 705$000 ($84.60).

This production average is taken from 1909–10 through 1926–27, the 18 years for which crop and number of tree figures are available from the secretary of agriculture, commerce, and public works of the State of Sao Paulo. The average number of bags for 18 years is 9,552,948; the average number of arrobas per 1,000 trees is 47.

Of the 705$000 an average amount of about 375$000 ($45) goes to the colonos in the form of wages. Usually these colonos are paid three times a year, or rather their accounts are balanced at the farm store from which they have been advanced supplies, and they receive the difference, if any, in cash. As is implied above, expenditures of working capital are so variable that it is necessary to fix arbitrarily on a plan for calculating them which is representative. Starting with the month of December, then, as the beginning of the cycle, we will say that 200$000 ($24) are needed, another 200$000 being paid out the following April, and the remainder, 305$000 ($36.60), used at the end of the picking season, about the 1st of September. On an average, it is safe to say that the crop is not sold in less than eight months from the time it is picked. This gives an average estimated cycle of 16 months from the time the crop begins to grow until it is sold. The commissario advances the working capital at an interest rate of 12 per cent per annum. Other methods of financing are available, but it is doubtful if the final interest costs, inclusive of commissions and similar charges, are ever materially less than 12 per cent. Therefore, the following calculation of interest on working capital can be made:

200$000 at 12 per cent from Dec. 31 to May 1, 16 months	32$000 ($3.84)
200$000 at 12 per cent from Apr. 30 to May 1, 12 months	24$000 ($2.88)
305$000 at 12 per cent from Aug. 31 to May 1, 8 months	24$400 ($2.93)
Interest on working capital per 1,000 trees	[2] 80$400 ($9.65)

III. DEPRECIATION AND AMORTIZATION

Land and trees.—The average bearing life of a tree is 33 years, fixed arbitrarily on account of variability. The cost of planting and growing to bearing age, 4 years, is placed at 1$000 per tree.[3] It is standard practice for laborers to contract for this work at the above price. Another contract plan which is common is that of planting and growing to the age of 5 or 6 years, with no charge, the remuneration being derived from the crop picked from the trees during this period as well as from the yield of catch crops, such as cereals and beans, which the owners allow to be planted among young trees.

The depreciation may thus be calculated at one thirty-third of 1$000, or 0$0303 ($0.004), per tree per year. As it is impossible to calculate the depreciation of the soil, it is considered good cost-accounting practice to make no allowance for it. We can say that depreciation of land and trees per year per 1,000 trees equals 30$303 ($3.64).

Other items.—The items of depreciation on buildings, drying grounds, and other permanent fixtures are very difficult to arrive at. They will be disregarded, since they are not, in any case, heavy enough to affect materially total costs, and the liberality of other cost items will cover them. Costs for amortization and depreciation of machinery are included under the heading "Conditioning for shipment."

IV. CULTIVATION

All cultivation is commonly taken care of on a contract basis with labor colonies. The colonos are paid from 200$000 to 550$000 ($24 to $66) per 1,000 trees per annum for this work, depending on the district; 375$000 ($45) is considered a fair average.[4]

As reliable data on the cost of fertilizing, replanting, and pest protection are lacking, no allowance is made for them. At present artificial fertilization and pest protection are not sufficiently universal in the State of Sao Paulo to make them important as factors in the cost of production. It is the almost universal custom to spread the coffee husks back on the land, but the colonos attend to this as part of their regular work. The cost of replanting is, for the most part, absorbed under cultivation costs and will be disregarded.

V. PICKING

Coffee is picked by contract at from 0$900 to 2$500 (11 to 30 cents) per 50 liters (about 45 quarts). An average cost is about 1$500 (18 cents) per 50 liters, or 3$000 (36 cents) per 100 liters. There are from 20 to 25 kilos of clean coffee in 100 liters of the cherries as they come off the trees. Hence, in the average production of 47 arrobas (clean coffee) per 1,000 trees, we have 705 kilos (clean coffee), or the equivalent of 3,279 liters of cherries, calculated on basis of 21.5 kilos clean coffee per 100 liters of cherries. At the rate of 3$000 per 100 liters the cost of picking for 1,000 trees averages 98$250 ($11.79).[5]

[2] This amount of 80$400, aside from being the interest on working capital, really includes what is ordinarily considered as crop-carrying costs in cost-of-production estimates of this kind. In the Brazilian coffee industry, however, the obvious costs of this class, such as warehousing charges, handling charges, and insurance, are not met by the grower. The State of Sao Paulo pays all of these items out of the revenue from the tax of 1$000 gold (55 cents) per bag for defense purposes, making no other charge of any kind to the fazendeiro. There remains the interest on the value of the crop, which is what has actually been included.

[3] Dr. Augusto Ramos in O Café; other authorities place this cost as high as 1$400 in 1928.

[4] The department of labor of the State of Sao Paulo, Boletim, fourth trimester of 1925, p. 451. This publication lists the average wages for care of trees in each municipality. The writer has averaged these and finds that, according to that department, the average costs of care for 1,000 trees annually is 214$000 ($25.68). If the labor is contracted for each cleaning, the cost of separate cleaning of the ground and trees, which is done about five times annually, averages less than 50$000 ($6) per 1,000 trees, which would make an annual average of 250$000 ($30). Labor prices have gone up, however, since 1925, and the writer's average of 375$000 ($45) may be considered liberal in view of these facts. Other sources give 450$000 ($54), 400$000 ($48), and from 300$000 to 500$000 ($36 to $60) annually per 1,000 trees for their care.

[5] Department of labor of Sao Paulo, Boletim, fourth trimester, 1925, p. 451, gives averages for picking costs in all municipalities. The writer has averaged these and found them to be from 750 reis to 2$500 per alqueire (50 liters). The general average is approximately 1$500. Dr. Augusto Ramos, in O Café, p. 197, says, "Picking (1923), 1$500 per arroba of clean coffee." This is equal to about 1$080 per 50 liters of cherries. Other sources give 3$000 per 100 liters; 1$000 to 2$000 per 50 liters; 1$500 per 50 liters.

VI. TRANSPORTATION

Although the cost of transport on the fazenda and to the railroad stations is highly variable, it can be estimated roughly. Lumping together the items of transport on the fazenda and costs on the drying grounds, we have the figure of about 0$700 (8 cents) per 100 liters.[6] With an average production of 3,279 liters of cherries per 1,000 trees, we arrive at the cost of 22$953 ($2.75) for fazenda transport and drying-ground costs.

Cost of transport from the farm to the railroad is, of course, dependent on the distance and the condition of the roads. However, taking the average distance to be 25 kilometers (15½ miles) and the cost at 50 reis per arroba per kilometer, we have the amount of 58$750 ($7.05) as transport cost to the railroad per average production of 1,000 trees.[7]

After a study of the freight rates from typical points in the interior, the writer has determined that the average charge is 7$000 (84 cents) per bag from the interior station to Santos. In terms of average production of 1,000 trees, this is 82$250 ($9.87). This figure is liberal. It was calculated in accordance with the amount of coffee which comes from each district, following standard freight rates in effect in 1927.

When the coffee arrives in Santos, it must be carted to the commissario's warehouse, the expense of which is usually borne by the grower. The customary charge for this service made by the commissario to the grower is 8 reis per kilo,[8] or 5$640 (68 cents) per average production of 1,000 trees.

Thus, the total transport costs met by the grower, to move the coffee from the trees to the commissario's warehouse in Santos, are 169$593 ($20.35).

VII. CONDITIONING FOR SHIPMENT

After the cherries have been dried the husks are milled off and the coffee cleaned of all extraneous matter. The larger fazendas are equipped with machinery to do this work, while the smaller growers send their uncleaned berries into the nearest town where a cleaning plant is located. The usual rate charged by these central

[6] Dr. Augusto Ramos, in O Café, says, "Fazenda transport and drying-ground costs are 590 reis per arroba of clean coffee." This is equivalent to about 424 reis per 50 liters of cherries. Mario Pinto Serva, special edition of O Jornal, 1927, says, "Cartage from trees to drying ground, drying, washing, spreading, etc., is nearly 500 reis per 50 liters." Nortz Bulletin, October, 1925, gives cartage and drying-ground treatment as 700 reis per 100 liters. Still another source, 1925, says "Farm transport and drying-ground treatment is 1$200 per arroba." This is equivalent to about 864 reis per 50 liters of cherries.

[7] Dr. Augusto Ramos, O Café, p. 197, says, "Transport from farm to railroad station, 250 reis per arroba in 1923." At 50 reis an arroba, this would make an average distance of 5 kilometers. Probably the distance is greater on an average, although it is impossible to calculate it. Mario Pinto Serva, special edition of "O Jornal," 1927, gives cartage to the station, 5 to 6 kilometers, as 1$500 to 2$000 per bag of 60 kilos. This equals from 80 to 100 reis per arroba per kilometer. Nortz Bulletin, October, 1925, places transport, 25 kilometers, 483 bags at 2:415$000. This is equal to 50 reis per kilometer per arroba. Another source says "Cartage to station of 30 arrobas from average fazenda is 15$000." This equals 500 reis per arroba for the total distance, and 20 reis per arroba per kilometer if the distance is put at 25 kilometers.

[8] The cost to the commissario is not this much, but free storage of the coffee for 30 days is allowed the grower, and part of this expense to the commissario is included in the 8 reis.

establishments is taken as an average cost.[9] The rates generally in force this year (1927–28) are 1$000 per 100 liters of dried cherries, about 3$000 per bag of cleaned coffee, and 35$250 ($4.23) per average production per 1,000 trees.

The coffee is handled on the fazenda and shipped to Santos in old sacks. When it is purchased for export, it is put into new sacks, the cost of which is met by the purchaser. On the fazenda, however, and on the way to Santos, the wear on sacks is heavy. Although the rate of depreciation on sacks is highly variable, it may be assumed to be between 20 and 50 per cent per annum. It will be considered at 33⅓ per cent. New bags cost 2$800; thus, the depreciation on the average production of 11¾ bags per 1,000 trees is one-third of 2$800 times 11¾, or 10$966 ($1.32).

The actual price paid for bags by the commissarios in Santos is variable. In large lots they have been bought at as low a figure as 2$200. Often, too, resewed and reconditioned bags are sent to the interior. Furthermore, many commissarios make no charge to the grower for bags. However, as no allowance has been made for depreciation on the extra-heavy large bags used for picking on the fazenda, and as the total amount allowed for all sack depreciation is small, it is considered fair to include it. Its liberality will make up for several other insignificant items it has been impracticable to include.

VIII. ADMINISTRATION COSTS

Administration costs are, naturally, highly variable. On the average fazenda of 100,000 trees it is customary to employ one administrador and two fiscaes (foremen). In 1928 the administrador on a plantation of that size received a salary of about 5 contos ($600) annually, while each of the fiscaes was paid 2½ contos ($300). This makes a total of 10 contos per year, or the equivalent of 100$000 ($12) per thousand trees.[10] On the larger farms the proportional wages are less and fewer fiscaes are needed, while on the smaller places the average runs slightly higher.

IX. LOSS OF WEIGHT

No account will be taken of loss of weight due to breakage and theft while the coffee is in transit; such loss is small and is balanced, in part or entirely, by the moisture taken up after leaving the fazenda.

X. CATCH CROPS

As the value of catch crops, which are grown extensively, to the fazendas, is almost impossible to calculate, this item will be con-

[9] Cleaning charges are fairly well standardized. The average charges made by the small mill owners at various railroad stations in the interior for the 1927–28 crop, according to several Santos commissarios, were as indicated. As the mill owner makes a profit above costs and depreciation on machinery, it is fair to consider the total costs to the grower (including depreciation on his machinery) who maintains his own plants no greater than the amount which he would be charged at the station mills. Probably it is not as great. Dr. Augusto Ramos, in O Café, p. 197, says, "Milling costs, 500 reis per arroba." This amounts to 2 milreis per bag (1923). Nortz Bulletin in 1925, says, "Milling 1:450$000 per 483 bags." This is equal to almost exactly 3$000 per bag. Another source says, "Milling costs 30$000 per 30 arrobas."

[10] Dr. Augusto Ramos, in O Café, page 197, says, "Administration costs per arroba, 800 reis." Calculating this in terms of a production of 47 arrobas per 1,000 trees, an administration cost of 37$600 per 1,000 trees is arrived at. Administration costs for a production of 60 or 47 arrobas would be the same. The average cost of 100$000 per 1,000 trees at present time is confirmed by several coffee men.

sidered as recompense for miscellaneous expenses too difficult to arrive at.

XI. MISCELLANEOUS, TAXES, ETC.

Usual municipal tax on trees, per 1,000 per year	2$000	($0.24)
NOTE.—This was determined by taking an average of the taxes in all municipalities, listed in O Café, published by the secretary of agriculture, commerce, and public works, 1926.		
State transport tax at 1$000 gold per bag, equal to 4$600 paper, per 1,000 trees, equals	54$050	($6.49)
Commissario's commission (taking market value Santos 5's at 23$000 per 10 kilos) at 3 per cent per average production per 1,000 trees	48$645	($5.83)
NOTE.—The commissario's commission is sometimes less than 3 per cent. The price of 23$000 per 10 kilos of spot Santos 5's is arbitrarily fixed, as no average can be determined on otherwise.		
State propaganda tax (200 reis per bag)	2$350	($0.28)
Total per average production of 1,000 trees	107$045	($12.84)

XII. UNEARNED INCREMENT

The unearned increment (natural increase in value of property) is one of the chief items in the profit made by the average coffee grower, but it is impossible to make any allowance for it in these cost-of-production figures.

SUMMARY

I. Interest on investment	750$000	($90.00)
II. Interest on working capital, inclusive of crop-carrying charges	80$400	($9.65)
III. Depreciation of trees	30$303	($3.64)
IV. Cultivation	375$000	($45.00)
V. Picking	98$250	($11.79)
VI. Transport	169$593	($20.35)
VII. Machining costs with depreciation on bags	35$250	($4.23)
VIII. Administration	10$966	($1.32)
XI. Taxes and commissario's commission	100$000	($12.00)
	107$045	($12.84)
Total	1:756$807	($210.82)

The above is the total cost of producing and laying down in the commissario's warehouse in Santos the average production (47 arrobas) of coffee per 1,000 trees. This is equivalent to a cost of 24$919 ($2.99) per 10 kilos, or 13.6 cents a pound.

Two or three small items of cost have not been included, as has been indicated, but they are very small and are made up for by the liberality of other calculation. It is also necessary to note that an average production of 47 arrobas per 1,000 trees is used all through these calculations, whereas the production in 1927–28 was very much higher, being an average of more than 60 arrobas per 1,000 trees.

COMPILATION BY SR. RENATO CALDEIRA

The usual manner in which Sao Paulo fazendeiros calculate cost of production is to allow a fixed sum for "custeio geral" (general costs). This includes cultivation, care, picking, replanting, machining, conservation, partial fertilization, cartage on the fazenda and to the station, labor, general repairs, and other items. On this basis,

Sr. Renato Caldeira, who has had wide experience as a fazendeiro, an interior purchasing agent, a commissario, and an exporter, has supplied the following summary, the latter items being based on the writer's preceding report. The figures are for the average production per 1,000 trees, 47 arrobas:

General costs	800$000	($96.00)
Profits, 15 per cent on capital at 5$000 per tree	750$000	($90.00)
Interest on 60 per cent of crop value (25$000 per arroba), at 12 per cent per annum for 10 months	70$500	($8.46)
Freight, average 7$000 per bag, and 1$000 gold tax	136$297	($16.36)
Municipal taxes and propaganda tax	4$350	($0.52)
Commissario, 3 per cent on 25$000 per 10 kilos in Santos	52$875	($6.35)
Cartage, at 8 reis per kilo	5$640	($0.67)
Total	1:819$662	($218.36)

This is equivalent to 25$811 ($3.10) per 10 kilos, or 14.06 cents a pound.

COMPILATION BY DR. J. C. MUNIZ

The following study of the cost of production of coffee in the State of Sao Paulo, presented in 1928 by Dr. J. C. Muniz, Brazilian consul at Chicago, to the agricultural associations of Sao Paulo, is of interest in connection with the foregoing analyses of costs, particularly since it shows costs in three types of fazendas, those in the old zone, those in the intermediary zone, and those in the new zone. The cost study is given in full, but the preliminary introductory remarks are shown here only in part.

Accepting the kind invitation extended to me by Dr. Mario Rolim Telles, I have just visited the coffee-producing districts in the State of Sao Paulo and now wish to present to the agricultural associations of the State a brief account of my impressions, particularly as far as the cost of production is concerned, which was the main object of my survey.

With reference to coffee, the cost of production is of magnified importance in view of the fact that we are its largest producers, the world distribution of which is made under our control. Our preservation of this position depends primarily on our capacity of producing more and at lower cost. Should we happen to lose our position in the coffee-growing industry, the main factor would undoubtedly be the increase of the cost of production to such an extent as to transfer the coffee culture to other parts of the globe where climatic conditions are favorable and labor is obtainable on better terms.

We think, therefore, we should carefully calculate the cost of production at short periods so as to enable us to take whatever steps may become necessary to the welfare of our main source of wealth. also serving as a justification of our attitude toward the consuming centers.

The large expansion of the Sao Paulo coffee-growing industry is a direct consequence of the financial and economic situation prevailing immediately after the Republic was established in Brazil, namely, the increase of immigration and the inflation of currency.

"During the period from 1889–90 to 1900–01," the economist, Dr. Paulo Pestana, states, "the State of Sao Paulo passed from 220,000,000 coffee trees producing 10,600,000 arrobas (15 kilos each) to 525,600,000 trees producing 35,700,000 arrobas. In the year 1927 Sao Paulo had 45,625 estates with a total cultivated area of 1,633,313 hectares, 1,047,496,350 trees, and a production of 30,506,100 arrobas. The number of new coffee trees not come into bearing was 136,750,000 in 1927."

The Sao Paulo coffee-growing industry, as a whole, is still in its extensive phase.

The abundance of unexplored lands rendered accessible by the construction of railway extensions provoked the immigration of capital and labor to new zones, as the fertility of the old districts tended to decline without the slightest

effort on the part of the growers to restore such fertility. The immigration was especially noteworthy over the Noroeste Railway and along the Paranapanema Valley. This system of agricultural exploitation—which the economists call predatory—is quite common in new countries.

The coffee fazenda, in general, is a very large property. It usually consists of extensive areas of coffee plantations, pastures, and forests. The essential improvements required, such as drying grounds, hulling plants, sheds, and dwellings for laborers, usually require a bulky capital, about 250:000$000 ($30,000) for a 500,000-tree fazenda.

As to labor, demands are not smaller. It is estimated that each 2,000 coffee trees require one laborer. Besides the men in charge of the coffee plantations, an average property requires a certain number of extra laborers for different works, such as machine operators, cartmen, motor drivers, cattle tenders, drying-ground laborers, etc.

COST OF FORMATION

The cost of formation of a coffee fazenda in the State of Sao Paulo has been considerably increased as a consequence of the high price of the land and labor brought about by the exploitation of distant zones. In the area served by the Noroeste Railway, where extensive coffee plantations are now being made, I have figured the expenses incurred with the establishment of the farms at the rate of 5$700 (68 cents) per tree.

The price of suitable coffee land there ranges from 800$000 to 2:000$000 ($96 to $240) per "alqueire" (24,200 square meters; about 6 acres). Now, knowing that 1 hectare (2.47 acres) contains 700 coffee trees, the cost of planting 1,000 trees will be as follows:

Cost of land	471$800	($56.62)
Cost of bringing trees to the bearing age (2$000 per tree)	2:000$000	($240.00)
Cleaning the land and planting the trees ($500 per tree)	500$000	($60.00)
Dwelling for laborers (a group of houses for each 10,000 trees costs 6:000$000)	600$000	($72.00)
Improvements and machinery ($500 per tree)	500$000	($60.00)
	4:071$800	($488.62)
10 per cent interest annually during 4 years	1:628$720	($195.44)
Total cost per 1,000 trees	5:700$520	($684.06)

The large investment of capital required for the formation of new plantations does not afford any compensation for the farmer before five years and yet is subject to countless risks, such as frost, low temperatures, pests, etc. The frosts occur periodically, the last one dating from 1918, which caused considerable damage to the coffee plantations of the State of Sao Paulo.

The coffee pest (*Stephanoderes hampei*) has already invaded a large portion of the old coffee district and is gradually becoming a factor in the rise of the cost of production.

COFFEE ZONES

Three different coffee zones are to be found in the State of Sao Paulo, namely, the old zone, the average or intermediary zone, and the new zone. The old zone comprises about 600,000,000 coffee trees more than 35 years old; the intermediary zone contains 300,000,000 trees, and the new one 100,000,000 trees. The ever-increasing reduction in the yield is easily explained by the large number of coffee trees which are rapidly decaying. In 1900–1901 the average yield per 1,000 trees in the State of Sao Paulo was 67.9 arrobas (2,241 pounds). In that particular year the existing 525,625,000 coffee trees produced 35,734,000 arrobas (1,179,222,000 pounds). In the crop year 1926–27 the number of coffee trees in bearing was 1,047,496,350, whose production was only 39,506,100 arrobas (1,303,701,300 pounds) or an average yield of 37.7 arrobas (1,244 pounds) per 1,000 trees. The average of the averages for each five years shows the same reduction. In the period from 1908–9 to 1912–13 the average of the averages was 55.1 (1,818 pounds); in the following five years' span, which preceded the large frost (1913–14 to 1917–18), the average was 57.3 (1,891 pounds). In 1918–19 to 1922–23 it dropped down to 34.5 (1,139 pounds). Comparing the years of the large crops—generally occurring under the influence of sun spots, according to the scientific explanation—it will be seen that while in 1906–7, 610,000,000 coffee trees produced 15,392,000 bags (2,031,744,000 pounds), the 1927–28 crop did not even reach 17,000,000 bags (2,244,000,000 pounds) in spite of the fact that the number of coffee trees had increased to over 1,000,000,000. [EDITOR'S NOTE.—The Sao Paulo 1927–28 crop has been officially placed at 19,381,010 bags since the foregoing was written.]

COST OF PRODUCTION

The cost of production is generally included among the items which influence supply of the commodities creating scarcity. Generally speaking, the cost of production involves all the expenditures made by the producer to produce and sell his goods. According to the economists, the cost of production is made up of five "cost groups": Cost of labor; cost of raw material, including transportation; cost of administration; cost of selling; and cost of interest. Some of them are of the opinion that interest should not be included in the cost of production unless borrowed capital is considered. However, the general opinion among the economists is that the interest must be included in either case, whether the capital is borrowed or owned by the producer. Unless capital is reasonably compensated, it should not be expected to remain invested in that particular business. If the price of a certain commodity is not high enough to cover all the expenses incurred with its production—including the interest on investment—a readjustment will have to be made so as to have price cover all costs.

In my endeavor to determine the exact cost of coffee production in the State of Sao Paulo, the five cost groups mentioned above have been taken into consideration.

Considering the fact that, in dealing with agricultural exploitation the cost varies according to the fertility of the soil, I have tried to determine three different types of cost; namely, the cost of production prevailing in the old zone, where the yield is smaller, and which we might call the highest cost; the cost of production prevailing in the intermediary zone; and the cost of production of the new district, where the soil is exuberant, which we might call the lowest cost. However, it must be remembered that the adjectives "highest" and "lowest" should not be taken in the strict sense of the word. It may be that there are properties in the State of Sao Paulo where the cost of production is above the highest one or below the lowest one taken as standard here.

In view of the impossibility of extending my researches throughout the whole State, I have decided to study one typical estate of each zone, thus determining three different bases for the cost of production, which I believe are quite representative of the cost of production prevailing in each separate zone. The cost is intimately connected with the yield. If the same amount of labor and capital are applied in the cultivation of three different areas producing 70, 55, and 37 arrobas (2,310, 1,815, and 1,221 pounds) per 1,000 trees, respectively, the cost of production will naturally rise inversely proportional to the yield. The yields adopted as standard for this work are 37, 55, and 70 arrobas per 1,000 trees, which are more or less coincident with the general average for each zone. The investment of capital was figured at 4$000, 5$000, and 6$000 (48, 60, and 72 cents) per tree for the old, intermediary, and new zones, respectively. Considering the exaggerated capitalization presently required by the coffee-growing industry in the State of Sao Paulo, these figures are quite reasonable. As I have already demonstrated, the cost of planting in the new zone comes out at 5$700 (68 cents) per tree, although the cost of land and labor considered were the very lowest obtainable. The current selling price of the coffee estates is now much above these bases.

In figuring the cost I have also included reserves for replanting and for depreciation of machinery and improvements. The reserves for replanting were figured at the rate of 3 per cent on the number of existing trees, admitting that the renewal of the plantations will be made at that rate in the intermediary and old zones. For the new zone the reserves were figured at 2 per cent. The depreciation of machinery and improvements was also figured at 3 per cent, considering their rather slow deterioration.

OLD ZONE

Fazenda A: 210,000 coffee trees; annual average yield per 1,000 trees, 37 arrobas (1,221 pounds); age of the plantations, 30, 40, and 60 years.

Cost of production of 37 arrobas of hulled coffee:

Item	Brazilian currency	United States equivalent
FIRST PART: LABOR		
(*a*) Treatment of the trees	300$000	$36.00
(*b*) Picking (3$000 per arroba)	111$000	13.32
(*c*) Transportation to the drying ground ($180 per arroba)	6$660	.80
(*d*) Drying ($360 per arroba)	13$320	1.60
(*e*) Hulling ($200 per arroba)	7$400	.89
(*f*) Laborers (5 men for the first 100,000 trees and 3 for each exceeding group of 100,000 trees; 26 working days in a month, at 6$000 a day)	65$520	7.86
(*g*) Pruning (52 reis per tree)	52$000	6.24
(*h*) "Repasse" (a second picking to prevent the spreading of the pest; $160 per tree)	160$000	19.20
Total	715$000	85.91
SECOND PART: MATERIAL		
(*a*) Bags for picking and for bagging hulled coffee	24$309	2.92
(*b*) Tools, etc	15$000	1.80
(*c*) Manuring ($250 per tree every four years, including the cost of manure)	62$500	7.50
Total	101$809	12.22
THIRD PART: OTHER COSTS		
(*a*) Administration (wage of administrador and his assistant)	40$975	4.92
(*b*) Transportation to the railway station ($300 per arroba)	11$100	1.33
(*c*) Gold tax (4$600 per bag)	42$550	5.11
(*d*) Municipal tax (2$000 per 1,000 trees)	2$000	.24
(*e*) Freight to Santos ($600 per arroba)	22$200	2.66
(*f*) Commission for commissario (3 per cent on 40$000)	44$400	5.33
(*g*) Cartage and cost of bagging ($800 per arroba)	29$600	3.55
(*h*) Reserves for replanting the coffee plantations ($500 per young tree and 3 per cent for annual replanting or the total renewal of the plantation in 33⅓ years)	15$000	1.80
(*i*) Depreciation of machinery and improvements (3 per cent on the value of machinery and improvements figured at the rate of $500 per tree)	15$000	1.80
Total	222$825	26.74
Cost of production of 37 arrobas of coffee, without interest	1:040$534	124.86
Cost of production of 1 arroba of coffee, without interest	28$122	3.37
Cost of production of 10 kilos of coffee, without interest	18$740	[1] 2.25
Upkeep of the estate	886$784	106.41
FOURTH PART: CAPITAL INVESTED FIGURED AT 4$000 PER TREE		
(*a*) Interest on the capital invested (10 per cent annually)	400$000	48.00
(*b*) Interest on the capital invested in the upkeep of the estate (12 per cent in 16 months) up to the date of sale of the coffee in Santos	141$885	17.03
Total cost of production of 37 arrobas of coffee including interest	1:582$419	189.89
Total cost of production of 1 arroba of coffee including interest	42$768	5.13
Total cost of production of 10 kilos of coffee, including interest	28$510	[2] 3.42

[1] Equivalent to 10.2 cents a pound. [2] Equivalent to 15.5 cents a pound.

INTERMEDIARY ZONE

Fazenda B: 270,000 coffee trees; annual average yield per 1,000 trees, 55 arrobas (1,815 pounds); age of the plantations, 30 and 40 years.

Cost of production of 55 arrobas of hulled coffee:

Item	Brazilian currency	United States equivalent
FIRST PART: LABOR		
(*a*) Treatment of the trees	500$000	$60.00
(*b*) Picking (1$920 per arroba)	105$600	12.67
(*c*) Transportation to the drying ground ($160 per arroba)	8$800	1.06
(*d*) Cost of drying ($320 per arroba)	17$600	2.11
(*e*) Cost of hulling ($400 per arroba)	22$000	2.64
(*f*) Laborers (5 men for the first 100,000 trees and 3 for each exceeding group of 100,000 trees)	68$640	8.24
(*g*) Cost of pruning ($050 per tree)	50$000	6.00
Total	772$640	92.72
SECOND PART: MATERIAL		
(*a*) Bags for picking and for bagging hulled coffee	36$135	4.34
(*b*) Tools, etc	12$000	1.44
(*c*) Cost of manuring ($400 per tree every four years, including the cost of manure)	100$000	12.00
Total	148$135	17.78
THIRD PART: OTHER COSTS		
(*a*) Administration (10:200$000 per annum)	37$000	4.44
(*b*) Transportation to station ($200 per arroba)	11$000	1.32
(*c*) Gold tax (4$600 per bag)	63$250	7.59
(*d*) Municipal tax (2$000 per 1,000 trees)	2$000	.24
(*e*) Freight to Santos (10$000 per bag)	137$500	16.50
(*f*) Commission for commissario (3 per cent on 40$000)	66$000	7.92
Total	316$750	38.01
THIRD PART: OTHER COSTS		
(*g*) Cartage and cost of bagging ($800 per arroba)	44$000	5.28
(*h*) Reserves for replanting the coffee plantations ($500 per young tree and 3 per cent for annual replanting or the total renewal of the plantation in 33⅓ years)	15$000	1.80
(*i*) Depreciation of machinery and improvements (3 per cent on the value of machinery and improvements figured at $500 per tree)	15$000	1.80
Total	74$000	8.88
Cost of production of 55 arrobas of coffee, without interest	1:311$525	157.38
Cost of production of 1 arroba of coffee, without interest	23$846	2.86
Cost of production of 10 kilos of coffee, without interest	15$890	[1] 1.91
Upkeep of the estate ($985 per tree)	985$775	118.29
FOURTH PART: CAPITAL INVESTED, FIGURED AT 5$000 PER TREE		
(*a*) Interest on the capital invested (10 per cent)	500$000	60.00
(*b*) Interest on the money invested in the upkeeping (12 per cent annually on 16 months, up to the date of sale of the coffee in Santos)	157$724	18.93
Cost of production of 55 arrobas of coffee, including interest	1:969$249	236.31
Cost of production of 1 arroba of coffee, including interest	35$804	4.30
Cost of production of 10 kilos of coffee, including interest	23$860	[2] 2.86

[1] Equivalent to 8.7 cents a pound. [2] Equivalent to 13 cents a pound.

NEW ZONE

Fazenda C: 470,000 coffee trees. Annual average yield per 1,000 trees, 70 arrobas (2,310 pounds); age of plantations, 4, 15, and 20 years.

Cost of production of 70 arrobas of hulled coffee:

Item	Brazilian currency	United States equivalent
FIRST PART: LABOR		
(*a*) Treatment of the trees	550$000	$66.00
(*b*) Cost of picking (2$560 per arroba)	179$200	21.50
(*c*) Transportation to the drying ground ($240 per arroba)	16$800	2.02
(*d*) Cost of drying ($115 per arroba)	8$050	.96
(*e*) Cost of hulling ($133 per arroba)	9$310	1.12
(*f*) Laborers (5 men for the first 100,000 trees and 3 for each exceeding group of 100,000 trees)	61$648	7.40
(*g*) Cost of pruning	50$000	6.00
Total	875$008	105.00
SECOND PART: MATERIAL		
(*a*) Bags for picking and for bagging hulled coffee	45$990	5.52
(*b*) Tools, limestone, wire, et cetera	17$710	2.13
(*c*) Cost of manuring ($300 per tree each four years including the cost of manure)	75$000	9.00
Total	138$700	16.65
THIRD PART: OTHER COSTS		
(*a*) Administration (including wages for the administrador, bookkeeper, fiscaes, and bonus for the administration)	66$400	7.97
(*b*) Transportation to the railway station ($200 per arroba)	14$000	1.68
(*c*) Gold tax (4$600 per bag)	80$500	9.66
(*d*) Freight to Santos (2$400 per arroba)	168$000	20.16
(*e*) Commission for commissario (3 per cent on 40$000)	84$000	10.08
(*f*) Cartage and cost of bagging ($800 per arroba)	56$000	6.72
(*g*) Municipal tax (2$000 per 1,000 trees)	2$000	.24
(*h*) Reserves for replanting ($500 per young tree and 2 per cent for annual replanting or the total renewal of the plantation in 50 years)	10$000	1.20
(*i*) Depreciation of machinery and improvements (3 per cent on the value of machinery and improvements, figured at $500 per tree)	15$000	1.80
Total	495$900	59.51
Cost of production of 70 arrobas of coffee, without interest	1:509$608	181.15
Cost of production of 1 arroba of coffee, without interest	21$565	2.59
Cost of production of 10 kilos of coffee, without interest	14$370	[1] 1.72
Upkeep of the estate (1$107 per tree)	1:107$048	132.85
FOURTH PART: CAPITAL INVESTED, FIGURED AT 6$000 PER TREE		
(*a*) Interest on the capital invested (10 per cent)	600$000	72.00
(*b*) Interest on the money invested in the upkeep of the farm (12 per cent annually during 16 months, up to the date of the sale of coffee in Santos)	177$127	21.26
Total cost of production of 70 arrobas of coffee, including interest	2:286$735	274.41
Total cost of production of 1 arroba of coffee, including interest	32$667	3.92
Cost of production of 10 kilos of coffee, including interest	21$770	[2] 2.61

[1] Equivalent to 7.8 cents a pound. [2] Equivalent to 11.8 cents a pound.

CONCLUSION

From the aforesaid it will be seen that the cost of production of one arroba of coffee is 42$768 in the old zone, 35$804 in the intermediary, and 32$667 in the new zone (15.5 cents, 13 cents, and 11.8 cents a pound). This is, of course, a very high cost, particularly so considering the reasonable bases adopted for the capital investment and for the interest on same. From the figures above mentioned we can detect the factors which are accounting for the increase in the cost of production. Such factors are: In the old zone, the reduction of the yield primarily due to the primitive methods still in use, lack of fertilizer on a large scale, and the *Stephanoderes hampei* (coffee pest), which rendered the cost of labor still higher, owing to the necessity of more careful picking, etc.

In the new zone the augmentation of the cost of production is also noteworthy. Labor there is much more expensive than in the old zone, owing to the scattered population and the great demand for labor for the new plantations. In the old zone the cost of labor is not so high, in view of its proximity to the large centers which supply them with abundant labor at lower prices. The transportation rates are also much higher in the new zones, owing to the great distances at which they are located.

Thus, while the exploitation of new areas along the Noroeste Railway and in the north of the State of Parana reduced the total cost of production by increasing the yield, on the other hand it provoked considerable rise in the cost of labor by scattering the population and augmented the cost of transportation, thus partly offsetting the higher productivity of the soil.

The displacement of the coffee cultivation toward the unexplored lands is a phenomenon that could not be avoided. Having occurred in all the other countries, it could not happen otherwise in Brazil, especially in the first phase of the agricultural exploitation. This fact contributed to the enlargement of the cultivated area in the State of Sao Paulo, but the coffee production gained nothing in intensiveness. The displacement of the planted area also provoked the abandonment of large, old plantations and reduced to a considerable extent the exploitation of many of them where large amounts of capital were invested in machinery and improvements, etc. It brought about higher cost of labor and scarcity of same. The inflation of the land price, which begins to be noticeable in the new districts, and the higher cost of labor will, in the future, stimulate a more intensive cultivation of the old and intermediary zones, where the estates will be, little by little, subdivided and operated by small proprietors on a more economical basis in order to obtain higher productivity.

Conclusion: Coffee cultivation in the State of Sao Paulo, with fully 600,000,000 trees frankly decaying, is already passing through the last phase of its extensive exploitation. The experience of other countries indicates the path we have to follow; to intensify cultivation by adopting the measures advised by experience and science or let the production of coffee decrease and weaken and completely disappear from our soil, where it has been a real wealth. Both land and climate in the State of Sao Paulo are very favorable for coffee cultivation. This industry, explored in the extensive way during more than half a century, made the economical grandeur of the State and Brazil. During this span of time, little has been done in the way of preserving the fertility of the soil and obtain higher productivity. The use of fertilizers and the most modern agricultural methods is still in its primordial days. Therefore, it will be readily seen that coffee is a wild plant amply compensating the slightest care used in its culture.

In Campinas, Dr. Rogerio Camargo showed me 100-year-old coffee plantations which with small care afforded compensating results.

Considering the conclusions arrived at by the Coffee Department of the Secretary of Agriculture, which constitutes a whole program about to be carried out in the State of Sao Paulo, the problem of intensifying the coffee cultivation may be solved along the following lines: (1) To fertilize the soil; (2) to hold the rain water; (3) to adopt better methods for treatment and picking; (4) to improve the preparation of the article. The permanent "enleiramento" [construction of long and narrow mounds of waste], so much advised all over the State, seems to condense most of the care required by the trees; it facilitates the creation of humus and paves the way for the "natural picking" which will ultimately improve the quality of the article.

To provide for proper treatment for the trees in order to secure better productivity and improve the qualities of the product, are the two main points toward which we should work hard for the solution of the problem.

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VALORIZATION AND COFFEE DEFENSE

HISTORY

For a period of 35 years, from 1880–81 to 1914–15, the world's production of coffee, exclusive of Brazil, averaged from about 4,000,000 to 4,500,000 bags annually. Brazilian production, however, increased during this period from an average of approximately 5,500,000 to an average of more than 13,000,000 bags annually. While the world consumption increased, it did so fairly steadily as against the fluctuating and high increase in production, the result being occasional periods of oversupply. Thus in the crop year 1896–97, when consumption rose from 11,000,000 to 12,500,000 bags, production increased from 10,500,000 to nearly 14,000,000 bags. Production, not reacting to market conditions, reached 15,070,000 bags in 1900–1901, 19,790,000 the following year, and 23,786,000 in 1906–7. Production, therefore, was almost doubled within 10 years. This condition of overproduction with falling prices caused the government of the State of Sao Paulo to initiate the first valorization operation.

The preliminary measure under this venture consisted of the promulgation of a law prohibiting for several years the planting of new coffee trees. This law became operative in 1902, but was not expected to have immediate effect, in view of the fact that coffee trees do not produce appreciable quantities before the fifth year. In 1906–7, however, the Government felt that the previous restriction of planting would thenceforth be effective, and resolved to intervene in the market. The visible supply at that time was about 16,000,000 bags, a surplus of some 11,000,000 bags over what had been considered the normal amount.

The Convention of Taubate was held on February 26, 1906, and an agreement was reached between the States of Minas Geraes, Rio de Janeiro, and Sao Paulo. Sao Paulo was authorized to undertake, with the joint responsibility of the three States, a loan of £15,000,000, guaranteed by a surtax of 3 francs, subject to change, which was to be collected by the Federal Government. However, the States of Minas Geraes and Rio de Janeiro are said to have failed in the support of the plan. Sao Paulo continued alone with the plan and eventually secured £1,000,000, which was insufficient, and her credit was exhausted. Several coffee merchants abroad, among them Herman Sielcken, became interested and the group agreed to advance 80 per cent of the sum required to purchase 2,000,000 bags at 7 cents a pound. The crop of 1906–7 turned out to be larger than anticipated and, in order to save the amount already involved, more money was needed. Eventually, at the end of 1906, a loan of £3,000,000 was arranged for, guaranteed by the surtax of 3 francs gold on each bag of coffee exported by the State. By the end of December, 1907, the State owned 8,146,123 bags of coffee. Most

of 1908 was spent in negotiations for refinancing. Finally, in December, 1908, an agreement was reached between the State and foreign bankers to the amount of £15,000,000. The contract was sanctioned by the Federal Government. To provide funds for the amortization the 3-franc surtax had been raised to 5 francs per bag. On December 31, 1907, the quantity of coffee held, bought, and stored amounted to 8,146,123 bags. Subsequent purchases brought this total up to 10,868,266 bags. Of this quantity, 3,781,894 bags were sold for consumption, leaving a balance of 7,086,372 bags on September 30, 1909. Of this, 6,483,152 bags were held by the committee in European and American ports. This stock was reduced by sales, between September 30, 1909, and February 15, 1912, to about 4,500,000 bags, which was eventually disposed of in subsequent years.

During the next several years consumption slowly gained, and it was not until 1917, owing to the reduced consumption of Europe because of the war, that the Government of Sao Paulo again felt called upon to protect her coffee growers. An agreement with the Federal Government was made, and the State received, as the result of an issue of paper money, 110,000 contos (roughly $27,500,000) for her defense purposes. With this money large quantities of coffee were bought in Santos and Rio de Janeiro and withdrawn from the market. The successful conclusion of this operation was probably due to the frost in 1918, which so greatly reduced production in Sao Paulo that the State was able to resell her withdrawn stocks at an alleged profit of about 128,000 contos (roughly $32,000,000), which was divided with the Federal Government.

In 1921 a third intervention was considered necessary, and the Federal Government issued sufficient paper money to purchase, with the help of other loans, about 4,500,000 bags of coffee. It soon became necessary to secure further financing of the operation, so that in 1922 a loan of £9,000,000 was effected with the already-purchased coffee stocks as collateral. A bankers' committee in London controlled the disposal of the stock, and their operations were kept under cover. It is believed that the coffee was sold by the end of 1924, and ex-President Epitacio Pessoa reported that the transaction yielded about 40 per cent profit; the banking interests and brokers connected with the operation also announced themselves to have been well satisfied.

SAO PAULO COFFEE INSTITUTE

In view of the success of the valorization schemes of 1906, 1917, and 1921, it was no surprise that the Federal Government, in 1922, authorized the creation of an institute for the permanent defense of coffee (Instituto de Defesa Permanente de Café). This was to be a Federal institution with a capital of 300,000 contos (roughly $39,000,000) and its functions were (1) to lend money at low interest rates to the growers, the collateral to be coffee deposited in official warehouses; (2) to purchase coffee and withhold it from the market when necessary; and (3) to disseminate propaganda to increase the consumption of coffee, the cost of this propaganda being paid by an extra tax of 200 reis (2.4 cents) per bag. Nothing definite was done on the plan until after the inauguration on No-

vember 15, 1922, of President Arthur Bernardes. His administration was anxious to bring about the stabilization of coffee prices in other ways than by direct market intervention, and proceeded with the following acts:

(1) Established, in Sao Paulo, rural warehouses with a storage capacity of approximately 3,500,000 bags, which quantity was believed to be large enough to care for the excess of production over consumption.

(2) Restricted daily receipts in Santos and Rio de Janeiro.

(3) Forbade trading in future options on the coffee exchange beyond the near three months.

FORMATION

From then until recently little information has been given out regarding the various operations of the Federal Government and of the State of Sao Paulo. It is known that the Federal Government, during 1922 and up to June, 1923, supported the market by means of direct purchases in Santos and Rio de Janeiro. This support was suddenly withdrawn in June, 1923, and prices dropped 35 to 40 per cent. The paper losses to the growers were so great that they protested very vigorously, asking that the market be supported again and that action be taken to establish the Defense Institute which had been provided for by the law of 1922. At the expense of exchange, and aided by a natural reaction, the Federal Government was able to bring coffee prices back to a more normal figure, though by no means to the high level maintained before the break in June. At the same time, the Federal Minister of Finance called for suggestions as to the best working plan for the Defense Institute. After much discussion, particularly in the State of Sao Paulo, that State passed law No. 2004 on December 19, 1924, creating the Paulista Institute for the Permanent Defense of Coffee. Soon thereafter the newly organized institute took over the federal regulatory warehouses and was vested with the entire control of the machinery for coffee defense in that State.

ORGANIZATION AND ADMINISTRATION

The administration of the institute was in the hands of a council composed of the secretary of finance and treasury of the State of Sao Paulo as president, the secretary of agriculture as vice president, and three other men of recognized worth appointed by the president of the State. Of these last three, two were nominated by the growers of the State and one by the Santos Commercial Association.

The funds for the defense plan were to be provided by a foreign loan which would be secured by a transportation tax of 1 gold milreis (55 cents) per bag of coffee. If the foreign loan could not be realized, the gold tax alone was to be accumulated into a reserve which might be used for defense purposes. This law was immediately effective, the transportation tax being collected, although the loan of £10,000,000 was not obtained until January, 1926.

The purposes of the new State defense institute were essentially the same as those of the Federal defense plan which had preceded it; to regulate entries into Santos, to make loans to planters against coffee deposited in the regulatory warehouses, to buy coffee in Santos when it was deemed necessary to support the market, and to organize a bureau of statistics and propaganda.

The above law became effective in December, 1924. In February, 1925, decree No. 3802 announced the details of the regulation and organization of the institute. Under the direction of Dr. Mario Tavares, secretary of finance and treasury, who was then president of the institute ex officio, the foundations of the present-day Instituto de Café do Estado de Sao Paulo were laid, and the defensive policies of restricting receipts, purchasing in the open market at Santos, and financing the grower were commenced.

During 1925 several controversies arose over the actions of the institute. Many planters in the interior objected to the severe restriction of entries into Santos. It often took from eight months to a year or more for their shipments to pass through the regulatory warehouses and arrive in Santos, where they might be sold. Many of them were unable to hold their coffee for such a long period and were forced to sell to interior buyers at a sacrifice. At the same time, the institute was not in a sufficiently strong financial position to be of much assistance in the way of making loans to the farmers for the purpose of holding their crop. Many Santos exporters were also displeased with the system because they were unable to supply their customers with desirable grades from the small stock allowed to enter the port. These controversies culminated into a question of the administration of the institute. One member of the administrative council was supposed to be nominated by the Commercial Association of Santos and two others by the planters of the State. The law had not been quite explicit as to their appointment, and the disaffected groups among the exporters and growers believed that their interests were being held secondary to political issues.

In March, 1926, a new decree as to internal regulation of the institute was passed. It clarified many points that were obscure, and clearly announced the system of appointment of officers of the council. The Commercial Association of Santos was to nominate two men, from whom the president of the State should select one. Each grower, when he registered with the institute, was to nominate two men, and from a list of these nominations the president would select the two members of the council who represented the grower. This decree also stated that in case of a vacancy in the council the president might appoint whomever he wished without consideration for previous nominations. Further, the secretary of finance and treasury, who is president of the institute, was empowered to veto any decisions of the council, the final decision to be made by the president of the State.

Finally, in October, 1926, in the reorganization of the institute, even the nominative rights of the Commercial Association of Santos were dropped. Law No. 2144 (under which the institute still operates) was passed, and, among other things, it specifically states that the council of the institute shall be composed of the secretary of finance and treasury as president, the secretary of agriculture as vice president, and three other members appointed (without any nomination) by the president of the State from persons of acknowledged standing in agriculture, commerce, or banking. In a word,

the direction of coffee defense in Sao Paulo became, and is to-day, in the hands of the State president and his appointees.

REGULATIONS OF MARCH, 1928

The official daily published on March 6, 1928, decree No. 4379–A of the State president authorized by law No. 2144, of October 26, 1926, indicating the regulations of the conduct of the Instituto de Café. This decree, though signed February 23, did not become effective until the date of its publication. It supersedes decree No. 4233–A of May 24, 1927. In brief, the regulations are as follows:

ORGANIZATION AND PURPOSES OF THE INSTITUTE

The institute is to be administrated under the secretariat of finance and treasury, having an advisory council, with fiscalization powers under the presidency of the secretary of finance and treasury, and composed of the secretary of agriculture as vice president, and of three members appointed by the president of the State from among persons of known competence in agriculture, commerce, or banking.

The defense of coffee, which will be accomplished by the institute under the exclusive direction of the secretariat of finance and treasury, will be constituted as follows:

(*a*) Regulate entries into the port of Santos by limitation of transport.

(*b*) Make loans through the Bank of the State of Sao Paulo to coffee growers and merchants, in accordance with conditions of quantity, time, interest, and guarantees of coffee stocks.

(*c*) Meet with the other coffee-producing States in the terms of these regulations.

(*d*) Buy coffee in the Santos market or in any other internal market for the purpose of temporarily withdrawing it from the market, but only when it is judged necessary for the regulation of price.

(*e*) Establish an information, statistical, and propaganda service, attending to publications in general, and repressing false statements about coffee.

A tax of 1 milreis gold, or its equivalent in paper, per bag of coffee in transit in the State is due; the tax shall serve as a guaranty for loans contracted by the institute on January 2, 1926, with the State of Sao Paulo and with foreign bankers.

The amount accruing from loans and their interest constitute the fund for the defense of coffee, part of which may be employed (1) in first-class security, at the judgment of the government, and (2) in operations in the defense of coffee in accordance with (*a*), (*c*), (*d*), and (*e*).

Funds borrowed for the institute or earned by it may not be confused with other State funds or used for anything but coffee defense.

The collection of the gold transport tax will be discontinued with the retirement of the various loans contracted by the institute.

In case of the cessation of the defense organized by this regulation, the balance of the fund existing on that date will revert proportionately to the contributors of the tax created for that purpose.

The railroads will collect the transport tax due on coffee shipments.

The railroads will receive a commission of 1 per cent of the taxes collected.

ADVISORY COUNCIL

The term of office of the members of the advisory council is one year, with the privilege of reappointment. The members serve without compensation.

In case of vacancy during their terms, the president of the State will appoint members to finish the term.

The council must approve the annual balance of the institute.

The secretary of finance and treasury, as president of the institute, presides at meetings; calls meetings; represents the institute in its external relations before the State, the Federal Government, or the municipality, as well as with banking establishments; directs the work of the employees of the institute who are responsible to him; maintains order at meetings; and may suspend the meetings if circumstances warrant.

The vice president substitutes in these functions when the president is not present.

PERSONNEL

The institute is directly subordinate to the secretary of finance and treasury, as its president, and will be administered by a director general, which has in its charge direct superintendence of accounts; fiscalization of transport; statistics, propaganda, publicity, and information; inscription of planters; distribution of quotas for dispatches; valuation of harvests; etc.

The institute has agents in Santos and Rio de Janeiro.

GENERAL DISPOSITIONS

No fixed property of the institute can be alienated or exchanged, and no bank stock or titles of credit may be transferred without the signature of the president of the State, the president of the institute, the members of the council, and the director general.

OPERATION

We now come to the working plan followed by the institute in accordance with law No. 2144 of October 26, 1926, and the above regulations. Until November, 1926, there was no definitely announced plan for determining the amount of coffee that was allowed to enter Santos. The growers dispatched their crops from the interior as soon as they were ready, or as soon as they cared to. The coffee was received in the institute's warehouses, placed on the routes of all railroads leading to Santos, and forwarded from these warehouses to Santos in the same chronological order as it was received, a certain arbitrary quota being sent down each day by each railroad to make up the total allowed to enter Santos. No charge was made to the grower by the institute for storage or handling in the warehouses, other than the general tax of 1 gold milreis (55 cents), which went to make up all expenses of coffee defense. When the market did not remain at a high level as a result of restrictions in Santos, the institute either purchased coffee outright and withdrew it from the market, or bought "futures" on the exchange.

In October, 1926, the institute announced a new plan for Santos entries. Effective November 5, 1926, it was promised that entries would be equal to the average daily exports from Santos of the previous month. That is, the total exports of the previous month would be divided by 25 (the number of working days per month) giving the daily quota which would be allowed to go down to Santos the following month. Before November 5 it was decided that the basis of the previous month would be embarkations on ships for export rather than actual clearances. The embarkations in October, 1926, for example, were 898,682 bags. This sum divided by 25 gives 35,947 bags. Consequently, entries into Santos during November were made at the rate of 36,000 bags per day. (Allowable entries, as indicated by the institute, are always given in round numbers, as it is impossible to fix them exactly, owing to the variation in size of the small-growers' lots which go to make up the day's shipments and which must be kept together.)

INTERSTATE COFFEE DEFENSE AGREEMENTS

FIRST: MAY, 1927

On May 28, 1927, at the invitation of the institute of Sao Paulo, representatives of the States of Sao Paulo, Minas Geraes, Rio de

Janeiro, and Espirito Santo met and signed an agreement to the effect that the same plan of entries into the ports of Rio de Janeiro and Victoria would be followed as was already in effect in Santos; as many bags would be allowed to enter the ports each month as were embarked for export the previous month.

The plan became effective on June 10, it being agreed that as a working basis 360,000 bags of coffee would be considered as the exports from the port of Rio de Janeiro during the previous month of May and 100,000 from Victoria. On the basis of an estimate of the percentage of coffee coming from each State to the ports of Rio de Janeiro, Victoria, and Santos, it was determined what the quotas allowed to enter the ports should be. The quotas were to be changed on the 10th of each month in accordance with the embarkations of the previous calendar month, the 10 days after the end of the month being allowed as time for calculations and notification of the railroads as to the allowable entries. Santos entries were to continue on the same plan as before, which is the same as described above, with the exception that no fixed date was set as the day when quotas are changed. It is, however, customary for the institute to revise entries on the 7th of each month, or as near to it as will correspond to the end of a week.

At this meeting, it was decided to hold another conference in September, 1927, to study the effects of the system inaugurated and make any further changes necessary.

SECOND: SEPTEMBER, 1927

In September, 1927, three more States joined the conference, making a total of seven, as follows: Sao Paulo, Minas Geraes, Rio de Janeiro, Espirito Santo, Pernambuco, Bahia, and Parana.

The following agreement was signed by them all on September 1:

(1) Entries of coffee into the markets of exportation of Brazil were to be in conformance with the same criterion as adopted in the previous convention; there were to be allowed to enter each month as many bags as were embarked for exportation from the respective ports the previous month.

(2) Maximum stocks to be allowed in the ports were: Victoria, 150,000 bags; Rio de Janeiro, 360,000; Santos, 1,200,000; Paranagua, 50,000; Bahia, 60,000; and Recife, 50,000.

(3) Entries into the port of Rio de Janeiro were to be in the following percentages: For the State of Rio de Janeiro, 30 per cent; Minas Geraes, 55.75; Espirito Santo, 11.75; and Sao Paulo, 2.5.

Entries into the port of Santos were to be as follows: For the State of Sao Paulo, 89 per cent, and for the State of Minas Geraes, 11. These percentages were to be in effect until such time as it could be verified certainly what was the correct ratio in respect to the production of the two States.

Entries into the port of Victoria were to be in the ratio of 110,000 bags for the State of Espirito Santo and 40,000 bags for Minas Geraes (approximately 73.6 per cent for Espirito Santo and 26.4 per cent for Minas Geraes), until such time as more definite calculations of the size of crops exportable from the two States had been made.

(4) The State of Parana was permitted to send to the port of Paranagua 2,000 bags per day, counting 25 working days in each month, or, in other words, 50,000 bags per month, until December 31, 1927. From January, 1928, dispatches to this port were allowable in quantities equal to the number of bags exported by the same port in the previous month.

(5) To complete the maximum quantity of stocks in each port, as determined in the second paragraph, a supplementary quota was established, which was to be commenced on any day which the States judged convenient, to bring the stocks up to maximum within 25 working days. This quota was to be suspended when it was verified that the New York future term market declined more than 10 points below the average of the previous week (the institute of Sao Paulo interpreted this as meaning a week's average of 10 points below the previous week's average); and was to be reestablished when the average weekly price in New York returned to its former level. For the execution of this clause, the average of the New York quotations of the last week in August (1927) was taken as a basis. This average was 11.84 cents per pound. The Sao Paulo Institute interpreted this as working on a rising scale, but not on a declining one. For example, if the New York market averaged 12.50 cents one week and 12.39 cents the next week, supplementary entries were not to be allowed during the following week, nor until such time as New York had averaged 12.40 cents or better.

As regards propaganda, it was agreed that a tax of 200 reis paper (2.4 cents) on each bag of coffee exported should be collected to be applied to propaganda for Brazilian coffee, which was to be intrusted to the Sao Paulo Coffee Institute quarterly.

THIRD: SEPTEMBER, 1928

At the meeting of the representatives of the coffee States on September 4, 1928, only a few changes were made from the agreement of September in the preceding year. The State of Goyaz was added to the list of coffee States in the agreement, making a total of eight States. The same provision was made for the entry quotas; the same maximum stocks were allowed. Entries into the port of Rio de Janeiro were still on the basis of 30 per cent from the State of Rio de Janeiro, 55.75 per cent from Minas Geraes, 11.75 per cent from Espirito Santo, and 2.5 per cent from Sao Paulo. The States of Minas Geraes, Sao Paulo, Espirito Santo, and Rio de Janeiro agreed to concede to the State of Goyaz a monthly quota, to enter the port of Rio de Janeiro, of 500 bags, following a proportional reduction in the respective quotas of the above-indicated States. The States of Sao Paulo and Minas Geraes agreed to cede to the State of Goyaz a monthly quota of 2,000 bags reduced from their quota in equal parts. (This refers to Goyaz's exports through Santos.) The entries at Santos were based on 91 per cent from Sao Paulo and 9 per cent from Minas Geraes. At the port of Victoria 110,000 bags from Espirito Santo and 40,000 from Minas Geraes were allowed. It was agreed that no more than 50,000 bags could enter the port of Paranagua each month; of this total 80 per cent was to be from the State of Parana and the remainder from the other States. Sao Paulo and Parana agreed that, until further notice, shipments of coffee from

Sao Paulo to Parana were to be prohibited. The same provision was made regarding supplementary quotas, determined by the average, in the previous week, of New York future quotations. The States agreed to continue to levy the tax of 200 reis per bag of coffee for the purpose of propaganda.

In computing the clearances of coffee, in order to determine monthly entries in the port, it was decided that there would be discounted only those shipments which leave one of the four ports of Rio de Janeiro, Santos, Paranagua, and Victoria and are destined to the other three. Each port was to use on its export bags whatever marks it judged convenient for the identification of the coffee exported by that port. The States signing this agreement decreed penalties for the infraction of this rule. In all cases the use of the word "Brazil" on the bags was to be obligatory, no port being allowed to use words which might cause confusion as to the identification of the port of origin.

A fourth meeting was to be held in September, 1929, at which necessary changes could be agreed upon.

COFFEE DEFENSE IN INDIVIDUAL STATES

MINAS GERAES

In November, 1925, representatives of the States of Minas Geraes and Sao Paulo met to settle on some plan as to coffee defense. Sao Paulo, of course, wanted Minas Geraes to follow the same plan she had adopted. The best that Minas Geraes would do, however, was to agree, on the 25th of that month, to distribute embarkations of coffee at the railroad stations in such a manner as to cause the crop to arrive on the export market in regular amounts during the year. That is to say, she would not agree to restrict embarkations to such an extent that part of the crop would be carried into the next year, as would happen under the Sao Paulo plan if the crop were large or if consumption demands were small. Authority for this agreement was given in law No. 887 of August 19, 1925.

On December 21, 1925, loan operations on the part of Banco do Credito Real do Estado de Minas Geraes (State bank) to coffee producers were commenced, as was authorized by law of the State congress. The fund for the defense of coffee was accumulated from the 1 gold milreis (55 cents) tax per bag, authorized by law No. 887 of August 19, 1925, and was loaned to the fazendeiros to assist them in carrying their crop through the year.

The plan as indicated above was carried out during the agricultural year 1926–27.

As Dr. Antonio Carlos, president of the State of Minas Geraes, stated in his message to congress in July, 1927, "For the crop of 1927–28, which appears to be a very large one, the agreement with Sao Paulo and other producing States can no longer permit of the clause in our law to the effect that the entire production be exported during the agricultural year; and as I could not agree to the inobservance of the above indicated clause, I was limited to the authorization of a provisional accord with the other coffee-producing States which depends upon your (the congress) authorization." The accord to which he refers is that of May 28, 1927, celebrated in Sao Paulo

by the four principal producing States and which had as its basis the plan that as much coffee would be allowed to enter the ports each month as was embarked for exportation during the previous month. Again on September 1 an interstate conference was held to determine how the plan agreed upon in May was working. At this conference the system of bringing stocks in the ports up to determined maximums, as explained in preceding pages, was settled on. It must be remembered, however, that neither of these agreements could become binding on the State of Minas Geraes until her congress made some change in the law No. 887 of August 19, 1925. It was not until the middle of September, 1927, that this change was made. The following is an excerpt from the revision:

> The government is authorized to enter into accord with the other coffee-producing States for the purpose of regulating transport and limiting exportation, up to the point that the entire crop of the agricultural year is shipped to the markets of exportation (foreign), or to the regulatory warehouses.

The message of the State president to congress in July, 1928, contains some remarks of interest in connection with coffee defense:

> Last April 30 a decree was issued, the purpose of which was to better our coffee defense service under the direction of the "Secção de Café," which is subordinate to the secretariat of finances, and under whose jurisdiction fall (*a*) the distribution of personnel, (*b*) transport of the product, and (*c*) the fiscalization and collection of taxes. Beyond this (considering that the existing agreement with the other coffee-producing States was provisional) in accordance with your authorization, I provided for the representation of our State at the convention held on September 1, 1927, for the purpose of making concrete and uniform the policy of the retention of the coffee crop. With the hindrance created by law No. 887, which required that the entire crop be shipped during the agricultural year, once removed, it became possible to adopt measures of limitation of the shipping of the crop by depositing it in warehouses. As it is easy to see, the signing of this accord limiting entries into the export markets to the amounts of the shipments of the previous month made it necessary that we make provisions to protect the producers from harm. In this emergency, only one course of action presented itself, which was the immediate renting of warehouses, as we were not provided with ones belonging to the State which would have been of sufficient capacity. In accordance with my instructions, warehousing contracts were made with Theodor Wille & Co., Cia. Armazens Geraes de Sao Paulo, and Cia. Armazens Geraes Mineiros, all of which were obliged to follow the stipulated conditions. As a natural consequence of this new system of coffee defense, a service was instituted whose purpose was the advancement of money against warehouse warrants issued by the above companies. This service is being handled by the Banco de Credito Real, Banco de Espirito Santo, Banco Commercial do Estado de Sao Paulo, and the Banco Commercial de Varginha. In advances to the farmers up to the present moment 36,345 contos have been employed (about $4,360,000). * * * Thus, within a short time, we will have, in the interior of the State, warehouses with a capacity of 1,750,000 bags, which are being constructed with the funds obtained from the 1-milreis gold tax per bag of coffee. * * * Of the warehouses belonging to the Minas Geraes coffee defense, those at Cruzeiro and Barra Mansa are functioning completely, and those at Cysneiros, Entre Rios, and Guaxupe are being constructed.

Minas Geraes was again a signatory to the interstate agreement of September 4, 1928, which was discussed in the preceding pages.

The Government of the State of Minas Geraes enacted on April 15, 1929, decree No. 9028 creating the Minas Geraes Coffee Institute. The regulations are briefly as follows:

The services of coffee exportation and defense created by law No. 887, of August 19, 1925, will be turned over to the Coffee Institute

as per Article No. 7, paragraph No. 1, of said law. The head office will be in Rio de Janeiro. The president-director is appointed by the president of the State. There are also a representative-director of the Banco de Credito Real of the State of Minas Geraes, as indicated by the directorate of the said bank; a director to be chosen from three names indicated by the Coffee Trade Center in Rio de Janeiro; and a director, chosen from three growers, elected at an assembly of Minas Geraes coffee planters to be held at Juiz de Fora. The directors will be nominated by the president of the State except in the last two cases. The institute will hold coffee agreements with other States, regulate the supply of Minas Geraes coffee to the exporting markets, make contracts for storage of coffee in the regulating warehouses, carry out coffee propaganda and a fiscalization service against falsifications, and elaborate internal regulations for the institute. The gold milreis tax is to continue. The institute will try to maintain a constant understanding with the Sao Paulo Coffee Institute.

RIO DE JANEIRO

The State of Rio de Janeiro took its first step in the direction of coffee defense in 1906. Her president, together with those of Sao Paulo and Minas Geraes, met at Taubate in February of that year and resolved to "valorize" and regulate the coffee business, maintaining a minimum price of from 55 to 65 francs per bag of 60 kilos. On the 4th of July of the same year this convention was modified, the minimum price for type 7 being set at from 32 to 36 milreis per bag. Provision was made for the creation of a surtax to guarantee foreign loans to be used for defense purposes, law No. 729 of August 10, 1906, fixing this tax at 3 francs per bag for all coffee shipped by water out of the Federal District of Rio de Janeiro. The system of "guias" (a sort of tax receipt) was established whereby the States did not allow the surtax to be paid until the guia was presented which proved the payment of the other State export tax. Each State then organized stocks of its coffee in Rio de Janeiro and limited the amounts on which the surtax could be paid. As no shipment out of the port could be effected without previous payment of the surtax, this plan was expected to be an effective defense measure. But, as it was not necessary to pay the State export tax at the time the coffee was first shipped from the interior, and as both States are said to have dispatched coffee for export without proper guias, owing to their becoming mixed in the warehouses so that their origin was unknown, this plan was ineffectual. Later laws straightened out the State tax-collection system.

Law No. 1979 of November 10, 1925, created in the State of Rio de Janeiro, in accordance with an agreement with Sao Paulo, a coffee defense service. On August 15, 1926, by law No. 2014, a proper organization of this service was made possible by the establishment of the Government bureau called the Instituto de Fomento e Economia Agricola. The regulations for the operation of this institute, which are essentially the same as those of Sao Paulo, were given in decree No. 2189 of the 21st of the same month. Its administration was placed in the hands of a president and two directors, the president holding his office ex-officio as State secretary of finance, one director representing the Government and nominated

by the president of the State, the other representing the growers after being chosen by them to hold the office of active vice president of the Society Fluminense of Agriculture and Rural Industry. The old maritime export surtax of 3 francs per bag was rescinded and the 1-milreis gold tax, as previously established in Sao Paulo, ordered collected. From September 1, 1926, to June 30, 1927, the sum of 2,788 contos (about $335,000) was obtained from this tax and turned over to the Instituto de Fomento to be used for defense purposes.

The mechanics of the defense system of the States of Rio de Janeiro, Minas Geraes, Espirito Santo, and Sao Paulo for coffee which leaves the country via the port of Rio de Janeiro are more complicated, although based on the same principles as those used at the port of Santos. Unlike conditions at Santos, coffee enters the port over several railroads. Instead of establishing regulatory warehouses well back in the interior, it was necessary to place them in the port itself. Shipments from each State go to their special warehouses, from which they are released onto the market in the agreed quantities. As much of the coffee from the States of Rio de Janeiro and Espirito Santo enters the port via Nictheroy, which is directly across the bay from Rio de Janeiro proper, warehouses have been established there. Coastwise shipments entering the port also go to warehouses, from which they may not be released onto the market except in accordance with the limitation regulations. Warrants are issued for deposited coffee, on which money may be borrowed either from private sources or from financial representatives of the various States. In Rio de Janeiro the State government is permitted to lend 50 milreis (about $6) per bag against warehouse warrants, at the rate of 9 per cent per annum to farmers and 10 per cent to local commissarios.

In October, 1927, the president of the State sanctioned the law which approved the agreements of May 28 and September 1, 1927, with Sao Paulo and the other producing States. Rio de Janeiro was also one of the States included in the convention of September 4, 1928.

ESPIRITO SANTO

Coffee defense is a much newer idea to the government and people of Espirito Santo than it is in Sao Paulo, Minas Geraes, and Rio de Janeiro. In fact, there seems to have been much passive resistance to the plan; however, the State has entered into discussions and agreements with other coffee States regarding entries. In any case, the following law, No. 1616, was passed on July 5, 1927:

The executive power of the State is authorized to:

(1) Organize a permanent coffee-defense service, entering into accord with other coffee-producing States for the purpose of limiting exportation, and creating for that end warehouses in Victoria, in the interior of the State, and in Rio de Janeiro.

(2) Levy a tax of 500 reis gold (about 27 cents) per bag of coffee for the purpose of financing the above operations and guaranteeing the extension of any credit deemed necessary to assist the growers. [It is reported that this tax was to be raised to 1 milreis gold early in 1929.]

(3) Contribute to an interstate fund for the purpose of foreign propaganda whatever sums considered advisable as long as they are drawn exclusively from the amount received as a result of the 500 reis gold tax (no other special tax for propaganda to be allowed).

(4) Suspend the execution of this law whenever the executive power judges it convenient.

An administrative branch of the Government has been organized to manage the defense service, the 500 reis gold tax has been collected, and regulatory warehouses have been established in the port of Victoria.

FEDERAL COFFEE CONTROL

After the Federal Government turned coffee defense over to the State of Sao Paulo, late in 1924, until 1927 it did not participate in affairs other than to furnish moral support to Sao Paulo and the other States. Soon after the interstate agreement of September 1, 1927, was effected, irregularities occurred which made it appear that one or more of the producing States was not strictly enforcing the clauses of the agreement. At about the same time a fazendeiro in the State of Rio de Janeiro obtained a decision from a Nictheroy judge to the effect that his constitutional right of free trade and barter was infringed upon by the defense system. True, there was a clause in the constitution permitting the Government to regulate internal or external commerce in case of emergency or for the public good, but there had never been any decree of regulation of this right. As soon as the situation was appreciated, a bill was rushed to the Federal House of Representatives and the Senate. After considerable discussion as to its constitutionality, decree No. 5378 passed both houses and was signed by the President of Brazil on December 14, 1927. It reads as follows:

The President of the Republic of the United States of Brazil: Let it be known that the National Congress and I sanction the following resolution:

ARTICLE I.—The Government is authorized to regulate the commerce of coffee between the ports of Brazil and those of the exterior, as well as between the various States; establishing, by permanent or temporary measures, the limitations which are judged to be in public interest.

ARTICLE II.—Dispositions to the contrary are revoked.

Since the passing of this law there has been no appreciable effect upon the defense system heretofore enforced.

SUMMARY

Brazilian Government regulation of the coffee industry consists of three principal features; (1) restriction of entries into the ports, (2) direct purchase of lots to be withdrawn from the market, and (3) financial assistance to the grower. The defense of coffee has been brought about chiefly by (1) and (3) in the past few years. The States of Sao Paulo, Minas Geraes, Rio de Janeiro, Espirito Santo, Pernambuco, Bahia, Parana, and Goyaz, which comprise all of the producing States of any importance, have agreed to regulate.

All States signatory to the latest inter-State agreement levy the special 200 reis tax per bag for propaganda purposes, remitting the proceeds to the Sao Paulo Coffee Institute, which is charged with the administration of the propaganda funds.

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